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MIGRANT AND SEASONAL FARMWORKER POWERLESSNESS

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HEARINGS

BEFORE THE

SUBCOMMITTEE ON MIGRATORY LABOR

OF THE

COMMITTEE ON LABOR AND PUBLIC WELFARE UNITED STATES SENATE

NINETY-FIRST CONGRESS

FIRST AND SECOND SESSIONS

ON

PESTICIDES AND THE FARMWORKER

SEPTEMBER 30, 1969

PART 6-C

Printed for the use of the Committee on Labor and Public Welfare

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36–513 O WASHINGTON : 1970

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Format of Hearings on Migrant and Seasonal Farmworker Powerlessness

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Part 1: Who Are the Migrants?	June 9 and 10, 1969
Part 2: The Migrant Subculture	July 28, 1969
Part 3–A: Efforts to Organize	July 15, 1969
Part 3–B: Efforts to Organize	July 16 and 17, 1969
Part 4–A: Farmworker Legal Problems	Aug. 7, 1969
Part 4–B: Farmworker Legal Problems	Aug. 8, 1969
Part 5–A: Border Commuter Labor Problem	May 21, 1969
Part 5–B: Border Commuter Labor Problem	May 22, 1969
Part 6–A: Pesticides and the Farmworker	Aug. 1, 1969
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MIGRANT AND SEASONAL FARMWORKER POWERLESSNESS

(Pesticides and the Farmworker)

TUESDAY, SEPTEMBER 30, 1969

U.S. SENATE,
SUBCOMMITTEE ON MIGRATORY LABOR
OF THE COMMITTEE ON LABOR AND PUBLIC WELFARE,
Washington, D.C.

The subcommittee met at 9:45 a.m., pursuant to recess, in room 4232, New Senate Office Building, Senator Walter F. Mondale (chairman of the subcommittee) presiding.

Present: Senators Mondale (presiding), Cranston, Murphy, and Schweiker.

Committee staff members present: Robert O. Harris, staff director; and Boren Chertkov, counsel to the subcommittee.

Senator MONDALE. The subcommittee will come to order.

Our first witness this morning is Dr. Paul Porter, assistant director, Shell Development Research Co., from Modesto, Calif.

Dr. Porter, will you please come to the witness table?

STATEMENT OF PAUL PORTER, PH. D., ASSISTANT DIRECTOR, SHELL DEVELOPMENT RESEARCH CO., MODESTO, CALIF.

Senator MONDALE. Do you have a prepared statement, Dr. Porter?

Mr. PORTER. Yes, I have. I would like to read it, if I may.

Senator MONDALE. You may proceed.

Mr. PORTER. My name is Paul Edward Porter and I reside at 506 Bowen Avenue, Modesto, Calif.

I received a Ph. D. in physical chemistry from Iowa State University in 1951.

I am an associate member of the International Union of Pure and Applied Chemistry on Terminal Residues. This commission was formed by the International Union of Pure and Applied Chemistry at the request of the food and agricultural organization and the World Health Organization of the United Nations to give them advice on the nature of the terminal residues, metabolic products, and breakdown products of pesticide compounds used in agriculture.

My function on the committee is to follow new developments on the "cyclodiene" insecticides of which aldrin is an example. Each year I prepare a summary of recent information on terminal residues of the cyclodiene insecticides. I am presently assistant

to the director, physical sciences, at Shell Development Co., Biological Sciences Research Center in Modesto and have been employed by Shell Development Co. since graduation.

For the past 15 years I have been concerned with residue analysis and metabolism studies on pesticide compounds. During the period from 1955 to 1968, I was manager of our physical and analytical chemistry laboratories. I participated in the development of analytical methods for determination of aldrin, dieldrin, endrin, and other compounds; and I supervised their use in obtaining residue data for registration. The Woodstock laboratories of Shell in England originated the application of the electron capture detector to pesticide residue analysis, and my laboratories utilized this technique before commercial equipment was available. From the beginning we have kept up with progress in the residue analysis field and have had experience with every type of analysis now in general use.

Aldrin is a chlorinated hydrocarbon insecticide in which the active ingredient is 1,2,3,4,10,10-hexachloro-1,4,4a,6,8,8a,-hexahydro-1,4-endo-exo-5,8-dimethanonaphthalene. It is a light tan solid insoluble in water but readily soluble in most common organic solvents.

It is moderately volatile: about 30 times as volatile as its epoxide dieldrin and about 150 times as volatile as DDT. Owing to this volatility its persistence on foliage is short, typically 1.5 to 2 days for disappearance of half the residue. Aldrin is therefore principally used as a soil insecticide or as a seed dressing and I know of no instance where it has been used on grapes within the last 3 years.

Senator MONDALE. You say that you know of no instance where aldrin is used on grapes. Yet, Senator Murphy introduced some materials in the Congressional Record on August 12, 1969, that have been introduced for the record hearing. On page S. 9868 you will find the study by the B. C. Laboratory, apparently a laboratory endorsed by growers and Senator Murphy, which says, among other things, that there was found on Bianco grapes 0.008 of aldrin. How did that get there?

Mr. PORTER. Whose laboratory was that?

Senator MONDALE. B. C. Laboratory.

Mr. PORTER. Well, later in my presentation I am going to develop the reasons why these analyses are very uncertain, particularly if they are only gas chromatographic analyses and unsupported by other work. Now, I have no way of knowing whether this——

Senator MONDALE. You have no knowledge of that particular survey?

Mr. PORTER. No, but I can say that at this level of residue you have a particularly difficult time in identifying what the compound is we are looking at.

If these analyses were on grapes within the last 3 years, I would say that it is probably a signal from the gas-liquid chromatography which was unsupported.

Senator MONDALE. This is the past year. One of the arguments is that no aldrin is being used there. What I cannot understand,

if it is not being used, is how do these tests continue to show its existence? Are there other possible explanations?

Mr. PORTER. Later in this presentation, I am going to try to say why it is that these things do appear to have aldrin content, but the signal from the method does not necessarily identify aldrin being present. It is very difficult to say positively that aldrin is there and particularly when you get below 0.01 parts per million it takes a great deal of effort and work to establish what the nature is. If I could go into that, I think I can explain.

When applied to the foliage of plants, aldrin is rapidly oxidized to its epoxide dieldrin. This reaction has been found to take place on glass plates in sunlight, and it also can take place as a result of metabolic processes in the plant as recently demonstrated by Oloffs and Lichtenstein (Journal of Agriculture Food Chem. 17,-143-147 (1969)). Owing to this rapid conversion, I cannot remember any case of an aldrin residue which did not also show some dieldrin, even when samples were taken immediately after spraying. Typical examples are the following:—These were just some that I pulled out of our files. To show a typical result for aldrin on tea at 4 ounces per acre immediately after spraying, zero days after spraying the aldrin gives 6.5 parts per million, the dieldrin 1.2 parts per million.

At 7 days aldrin 0.7, dieldrin, 2.6.

This is a particular dissipation. Aldrin disappears very rapidly from the foliage, the dieldrin tends to increase.

At 8 ounces per acre, 8 eight ounces of aldrin we close at 0.2 parts per million and dieldrin 1.9 parts per million. And the aldrin on grass is a very similar situation with definite amounts of dieldrin present along with the aldrin.

Another good example is provided by the work of Harrison et al, Journal of Science and Food Agriculture, Volume 18, pages 10 to 15, 1967.

We have carried out field trials designed to show whether residues occur at application rates double those recommended for use against grasshoppers. Determinations were made on samples taken 1 day after spraying in order to determine maximum residues.

At a quarter of a pound per acre there was less than one-tenth part per million on grapes at 1 day, at a half pound per acre applied less than a tenth of a part per million at 1 day.

Based upon these considerations, I believe that application rates of at least 10 to 15 pounds of aldrin per acre would be needed to produce residues of 18 parts per million on grape berries immediately after spraying. This would be a ridiculous rate of application and is extremely unlikely to be used in any known application of aldrin.

Going over to the subject of analysis of crop samples for pesticide residues, tremendous progress has been made in recent years in analytical instrumentation and techniques; however, there is still a lot of room for improvement. In particular, it is still extremely difficult and expensive to ascertain whether or not the apparent pesticide content of a sample resulting from applica-

tion of an analytical method is truly the pesticide or some other chemical which responds similarly to the technique used for analysis.

There is some confusion on this point because equipment and methods are available which can almost unequivocally establish the presence of a given pesticide in the part per million range; however, the equipment is expensive—in the range of $30 to $40,000 per unit, and it is slow to use. Accordingly, it is used only on a few critical samples. The equipment I refer to is the mass spectograph preferably directly coupled to a gas-chromatographic column.

Reasonable certainty in identification can sometimes be achieved by appropriate combinations of techniques such as chemical transformations together with several chromatographic methods. Again this multiplies costs and requires highly skilled analysts. Routine laboratories cannot afford this type of checking except upon an extra-cost basis on special samples.

The presently preferred methods for pesticide residue analysis are gas-liquid, thin layer, paper, and liquid-liquid chromatography; classical colorimetric methods; and electrometric methods. Each of these was originally developed for analysis of ordinary chemical and petroleum products. They are still used for this purpose, and each of the methods yields responses to a wide assortment of compounds with sensitivities depending upon the type of detector or sensing device used. The secret of success in applying these methods to trace analysis lies in finding sensing methods which are very selective, having far higher sensitivity to the compound of interest than to other assorted compounds which fall in the same chromatographic range.

Remarkable success has been achieved in finding such selective detectors in all the general areas mentioned above; however, there are limits to the selectivity and in each case many compounds will appear identical insofar as a given method is concerned. Those compounds which cannot be told apart by a method are usually called interfering compounds or artifacts of the method. Due regard must be paid to all of these possibilities in assigning a method response to a given compound.

The most common method of analysis applied to the chlorinated insecticides is gas-liquid chromatography. In this technique the various chemicals in a sample solution are separated by passing them in a stream of gas over a column of suitable liquid supported on a solid carrier, and are usually detected as a series of peaks on a recorder chart representing the output responses of the detector.

These peaks have a characteristic bell-shaped form; the time or distance to the maximum value from the time of injection is usually called the retention time, and each compound on a given column should produce a peak having a very definite value of this retention time. The width of the peak is a very important characteristic and it is determined by many factors associated with the efficiency of the column being used. In general, longer columns and slower flow rates yield more favorable ratios of peak widths to retention times and should be used whenever possible since the greater efficiency provides more freedom from interferences.

On the other hand, highly efficient columns require a great deal of analysis time, and sensitivity is lower than for the shorter less efficient columns. As a result, most laboratories compromise, and use the shortest column that they feel will provide an adequate result. This leads to difficulty in definite assignment of peaks and increases chances of interference.

Of the detectors available for gas-liquid chromatography, the most popular for chlorinated insecticides is the electron-capture detector. It responds strongly to any compound which readily absorbs an electron to form a negative ion. Chlorine containing compounds generally give a powerful response while most other chemicals commonly encountered in crop extracts do not. It is thus somewhat selective, but it still responds to a wide range of chemicals, and it is rare that one finds a crop extract that does not have a number of peaks in the electron-capture chromatogram at the levels of sensitivity which are employed in pesticide residue analysis. Thus, when a peak is absent at the characteristic point for a given pesticide, there is certainly none of that compound in the extract. On the other hand, if a peak is present at exactly that point, the pesticide may be present, but the signal may be due to an interference.

The analyst as a practical matter often relies in such a case upon the relative probability that the particular chemical would or would not be in his sample to make a decision as to its identity. If, for example, aldrin had just been sprayed, it would be reasonable to assign the signal to aldrin. Even if such knowledge is available, however, this does not prove the identity of the material producing the response.

If this probability is not known, confirmatory tests are definitely necessary. That is, the analyst must apply additional different techniques which are thought to differentiate most of the interferences of the first method. If these additional tests agree with the first, both qualitatively and quantitatively, it greatly increases confidence in the assignment of identity.

Many laboratories choose thin-layer chromatography as a second technique. This is usually a good choice if the proper system is used, but it is not absolutely conclusive. Compounds which interfere in one type of chromatography often interfere in other types owing to a general similarity in physical properties. Introduction of a selective chemical reaction at this stage is advisable. In the case of chlorinated compounds reaction with silver nitrate provides a degree of specificity, but does not guard against sulphur containing compounds which also react with silver ion. An example of chemical treatment which is particularly effective in the identification of aldrin, is its oxidation to dieldrin as suggested by Noren (Analyst 93, 94–41 (1968)). Quoting the summary of Noren's article:

"The determination of aldrin in certain samples of vegetables by gas chromatography has proved to be difficult as peaks from impurities interfere. To eliminate this disadvantage, a method was developed in which aldrin was converted to dieldrin and the amount of dieldrin determined by gas chromatography.

Referring specifically to aldrin in electron capture gas-liquid chromatography, interferences such as indicated above are rather common, even when the extracts are given a preliminary separation by column-absorption chromatography. If no such preliminary treatment is applied it is rare that usual aldrin residues can be successfully determined. Plasticizer components from plastic bags or other containers appear to be aldrin in some cases.

The wrappers for samples must be carefully selected—in our laboratory we make interference tests on bag materials before using them. Reagents sometimes contain interferences, or as they are often called "artifacts" of the method. An aldrin "artifact" which is so notorious in gas-liquid chromatography that it is often called "the aldrin artifact" was identified by Pearson et al (Journal of Agriculture Food Chem. 15 938–9 (1967)) as elemental sulphur. And I have that attached as Exhibit A.

Sulphur behaves as aldrin on columns of DC–200 silicone oil which is widely used as a gas-liquid chromatographic liquid. When retention times are short, sulphur coincides with aldrin also on mixed DC–200–OF–1 columns which are also commonly used. On thin-layer chromatography sulphur is developed in a number of solvent systems very close to aldrin and can be mistaken for it when the usual phenoxy-ethanon-silver nitrate developing reagent is used.

With regard to the high levels of aldrin which have been reported on grape samples which are at issue before this committee, while it is possible the grapes could have been "spiked" with aldrin, it is my feeling that sulphur interferences is a most logical answer. Sulphur is used in large amounts on grapes for mildew and mite control, and thus could be present to an extent sufficient to account for the readings observed. On the other hand, as discussed previously, there is no reason to expect any aldrin on grapes from California.

Another material which can be mistaken for aldrin in gas chromatography is Kelthane. This compound breaks down in the gas chromatography to bis p-chlorophenyl ketone which emerges coincident with aldrin on nonpolar columns and very close to aldrin on polar columns. The difference between them can be easily distinguished by thin-layer chromatography on alumina with n-heptane development.

In my opinion, the methods used by the Food and Drug Administration for determination of aldrin and other chlorinated insecticides are highly reliable. Our own methods are essentially the same. I feel a clean-up technique, such as the Mills procedure described in the FDA manual should always be used to exclude the bulk of the plant extractives.

Gas-liquid chromatography with electron capture detection is satisfactory as the primary method of analysis with a column of equal parts of DC–200 and QF–1 fluids. The column should be long enough to provide a peak for each compound with base width no greater than one-tenth the retention time. Confirmation by thin-layer chromatography as described in the FDA manual is reliable but is by no means positive proof that a GLC peak and a TLC spot correspond only to one pesticide. If the identification is critical, other tests must be used such as the following:

1. Gas chromatography with alternate more specific detectors, microcoulometric cells specific for chlorine or sulphur flame-photometric detectors sensitive to phosphorous or sulphur, plasma discharge cells producing characteristic emissions for a number of elements, mass-spectometric with a high degree of specificity.

2. This layer chromatography with elemental analysis or colorometric analysis of spots.

3. Chemical treatments of the residue extracts to alter the compound of interest or to destroy it leaving the interfering background. The reverse may be possible, destroying the materials producing the interference under conditions which would not destroy the pesticide.

That concludes my statement.

(The prepared statement, with accompanying exhibit, of Mr. Porter follows:)

PREPARED STATEMENT OF DR. PAUL E. PORTER, ASSOCIATE MEMBER OF THE INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY ON TERMINAL RESIDUES, MODESTO, CALIF.

My name is Paul Edward Porter and I reside at 506 Bowen Avenue, Modesto, California.

I received a Ph.D. in Physical Chemistry from Iowa State University in 1951.

I am an associate member of the International Union of Pure and Applied Chemistry on Terminal Residues. This commission was formed by the International Union of Pure and Applied Chemistry Commission at the request of the Food and Agriculture organization and the World Health Organization of the United Nations to give them advice on the nature of the terminal residues, metabolic products and breakdown products of pesticide compounds used in agriculture. My function on the committee is to follow new developments on the "cyclodiene" insecticides of which aldrin is an example. Each year I prepare a summary of recent information on terminal residues of the cyclodiene insecticides. I am presently assistant to the director, physical sciences, at Shell Development Company, Biological Sciences Research Center in Modesto and have been employed by Shell Development Company since graduation.

For the past 15 years I have been concerned with residue analysis and metabolism studies on pesticide compounds. During the period from 1955 to 1968, I was manager of our physical and analytical chemistry laboratories. I particiuated in the development of analytical methods for determination of aldrin, dieldrin, endrin and other compounds; and I supervised their use in obtaining residue data for registration. The Woodstock laboratories of Shell in England originated the application of the electron capture detector to pesticide residue analysis, and my laboratories utilized this technique before commercial equipment was available. From the beginning we have kept up with progress in the residue analysis field and have had experience with every type of analysis now in general use.

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It is moderately volatile: about 30 times as volatile as its epoxide dieldrin and about 150 times as volatile as DDT. Owning to this volatility its persistence on foliage is short, typically 1.5 to 2 days for disappearance of half the residue. Aldrin is therefore used as a soil insecticide or as a seed dressing and about 150 times as volatile as DDT. Owing to this volatility its perlast three years.

When applied to foliage aldrin is rapidly oxidized to its epoxide dieldrin. This reaction has been found to take place on glass plates in sunlight, and it also can take place as a result of metabolic processes in the plant as recently demonstrated by Oloffs and Lichtenstein (J.Agr.Food Chem. *17*, 143–147 (1969)). Owing to this rapid conversion, I cannot remember any case of

an aldrin residue which did not also show some dieldrin, even when samples were taken immediately after spraying. Typical examples are the following:

	Days after spraying	Residue, p.p.m.	
		Aldrin	Dieldrin
WK 43/63 Aldrin on tea:			
4 oz./acre	0	6.5	1.2
	7	0.7	2.6
8 oz./acre	0	24	3.7
	7	0.2	1.9
Bio 56/30 Aldrin on grass:			
2 oz./acre	0	1.3	0.20
	7	0.3	0.44
4 oz./acre	0	1.8	0.4
	7	0.6	0.5

Another good example is provided by the work of Harrison et al J.Sci.Fd.Agric. *18* 10–15 (1967).

We have carried out field trials designed to show whether residues occur at application rates double those recommended for use against grasshoppers. Determinations were made on samples taken one day after spraying in order to determine maximum residues.

Bio 55/82 Aldrin on grapes:

0.25 lb./acre, less than 0.1 ppm at 1 day.

0.5 lb./acre, less than 0.1 ppm at 1 day.

Based upon these considerations, I believe that application rates of at least 10 to 15 lbs. of aldrin per acre would be needed to producde residues of 18 ppm on grape berries immediately after spraying. This would be a ridiculous rate of application and is extremely unlikely to be used in any known application of aldrin.

Going over to the subject of analysis of crop samples for pesticide residues, tremendous progress has been made in recent years in analytical instrumentation and techniques; however, there is still a lot of room for improvement. In particular, it is still extremely difficult and expensive to ascertain whether or not the apparent pesticide content of a sample resulting from application of an analytical method is truly the pesticide or some other chemical which responds similarly to the technique used for analysis.

There is some confusion on this point because equipment and methods are available which can almost unequivocally establish the presence of a given pesticide in the part per million range; however, the equipment is expensive—in the range of $30 to $40,000 per unit, and it is slow to use. Accordingly, it is used only on a few critical samples. The equipment I refer to is the mass spectrograph preferably directly coupled to a gas-chromatographic column.

Reasonable certainty in identification can sometimes be achieved by appropriate combinations of techniques such as chemical transformations together with several chromatographic methods. Again this multiplies costs and requires highly skilled analysts. Routine laboratories cannot afford this type of checking except upon an extra-cost basis on special samples.

The presently preferred methods for pesticide residue analysis are gas-liquid, thin layer, paper, and liquid-liquid chromatography; classical colorimetric methods; and electrometric methods. Each of these was originally developed for analysis of ordinary chemical and petroleum products. They are still used for this purpose, and each of the methods yields responses to a wide assortment of compounds with sensitivities depending upon the type of detector or sensing device used. The secret of success in applying these methods to trace analysis lies in finding sensing methods which are very selective, having far higher sensitivity to the compound of interest than to other assorted compounds which fall in the same chromatographic range. Remarkable success has been achieved in finding such selective detectors in all the general areas mentioned above; however, there are limits to the selectivity and in each case many compounds will appear identical insofar as a given method is concerned. Those compounds which cannot be told apart by a method are usually called interfering compounds or artifacts of the method. Due regard must be paid to all of these possibilities in assigning a method response to a given compounds.

The most common method of analysis applied to the chlorinated insecticides is gas-liquid chromatography. In this technique the various chemicals in a sample solution are separated by passing them in a stream of gas over a column of suitable liquid supported on a solid carrier, and are usually detected as a series of peaks on a recorder chart representing the output responses of the detector. These peaks have a characteristic bell-shaped form; the time or distance to the maximum value from the time of injection is usually called the retention time, and each compound on a given column should produce a peak having a very definite value of this retention time. The width of the peak is a very important characteristic and it is determined by many factors associated with the efficiency of the column being used. In general, longer columns and slower flow rates yield more favorable ratios of peak widths to retention times and should be used whenever possible since the greater efficiency provides more freedom from interferences. On the other hand, highly efficient columns require a great deal of analysis time, and sensitivity is lower than for the shorter less efficient columns. As a result, most laboratories compromise, and use the shortest column that they feel will provide an adequate result. This leads to difficulty in definite assignment of peaks and increases chances of interference.

Of the detectors available for gas-liquid chromatography, the most popular for chlorinated insecticides is the electron-capture detector. It responds strongly to any compound which readily absorbs an electron to form a negative ion. Chlorine containing compounds generally give a powerful response while most other chemicals commonly encountered in crop extracts do not. It is thus somewhat selective, but it still responds to a wide range of chemicals, and it is rare that one finds a crop extract that does not have a number of peaks in the electron-capture chromatogram at the levels of sensitivity which are employed in pesticide residue analysis. Thus, when a peak is absent at the characteristic point for a given pesticide, there is certainly none of that compound in the extract. On the other hand if a peak is present at exactly that point, the pesticide may be present, but the signal may be due to an interference.

The analyst as a practical matter often relies in such a case upon the relative probability that the particular chemical would or would not be in his sample to make a decision as to its identity. If, for example, aldrin had just been sprayed, it would be reasonable to assign the signal to aldrin. Even if such knowledge is available, however, this does not prove the identity of the material producing the response.

If this probability is not known, confirmatory tests are definitely necessary. That is, the analyst must apply additional different techniques which are thought to differentiate most of the interferences of the first method. If these additional tests agree with the first, both qualitatively and quantitatively, it greatly increases confidence in the assignment of identity.

Many laboratories choose thin-layer chromatography as a second technique. This is usually a good choice if the proper system is used, but it is not absolutely conclusive. Compounds which interfere in one type of chromatography often interfere in other types owing to a general similarly in phyiscal properties. Introduction of a selective chemical reaction at this stage is advisable. In the case of chlorinated compounds reaction with silver nitrate provides a degree of specificity, but does not guard against sulphur containing compounds which also react with silver ion. An example of chemical treatment which is particularly effective in the identification of aldrin, is its oxidation to dieldrin as suggested by Noren (Analyst *93*, 39–41 (1968)). Quoting the summary of Noren's article: "The determination of aldrin in certain samples of vegetable by gas chromatography has proved to be difficult as peaks from impurities interfere. To eliminate this disadvantage, a method was developed in which aldrin was converted to dieldrin and the amount of dieldrin determined by gas chromatography.

Referring specifically to aldrin in electron capture gas-liquid chromatography, interferences such as indicated above are rather common, even when the extracts are given a preliminary separation by column-adsorption chromatography. If no such preliminary treatment is applied it is rare that usual aldrin residues can be successfully determined. Plasticizer components from plastic bags or other containers appear to be aldrin in some cases. The wrappers for samples must be carefully selected—in our laboratory we make interference tests on bag materials before using them. Reagents sometimes con-

tain interferences, or as they are often called "artifacts" of the method. An aldrin "artifact" which is so notorious in gas-liquid chromatography that it is often called "the aldrin artifact" was identified by Pearson et al (J. Agr. Food Chem. *15* 938–9 (1967)) as elemental sulphur. (Exhibit A) Sulphur behaves as aldrin on columns of DC–200 silicone oil which is widely used as a gas-liquid chromatographic liquid. When retention times are short, sulphur coincides with aldrin also on mixed DC–200-QF–1 columns which are also commonly used. On thin layer chromatography sulphur is developed in a number of solvent systems very close to aldrin and can be mistaken for it when the usual phenoxy-ethanol-silver nitrate developing reagent is used.

With regard to the high levels of aldrin which have been reported on grape samples which are at issue before this committee, while it is possible the grapes could have been "spiked" with aldrin, it is my feeling that sulphur interferences is a most logical answer. Sulphur is used in large amounts on grapes for mildew and mite control, and thus could be present to an extent sufficient to account for the readings observed. On the other hand, as discussed previously, there is no reason to expect any aldrin on grapes from California.

Another material which can be mistaken for aldren in gas chromatography is Kelthane. This compound breaks down in the gas chromatograph to bis p-chlorophenyl ketone which emerges coincident with aldrin on non-polar columns and very close to aldrin on polar columns. The difference between them can be easily distinguished by thin-layer chromatography on alumina with n-heptane development.

In my opinion the methods used by the Food and Drug Administration for determination of aldrin and other chlorinated insecticides are highly reliable. Our own methods are essentially the same. I feel a clean-up technique, such as the Mills procedure described in the FDA manual should always be used to exclude the bulk of the plant extractives. Gas-liquid chromatography with electron capture detection is satisfactory as the primary method of analysis with a column of equal parts of DC–200 and QF–1 fluids. The column should be long enough to provide a peak for each compound with base width no greater than 1/10 the retention time. Confirmation by thin-layer chromatography as described in the FDA manual is reliable but is by no means positive proof that a GLC peak and a TLC spot correspond only to a pesticide. If the identification is critical, other tests must be used such as the following:

1. Gas chromatography with alternate more specific detectors microcoulometric cells specific for chlorine or sulphur flame-photometric detectors sensitive to phosphorous or sulphur, plasma discharge cells producing characteristic emissions for a number of elements, mass-spectometric with a high degree of specificity.

2. Thin layer chromatography with elemental analysis or colorometric analysis of spots.

3. Chemical treatments of the residue extracts to alter the compound of interest or to destroy it leaving the interfering background. The reverse may be possible, destroying the materials producing the interference under conditions which would not destroy the pesticide.

[From: JOURNAL OF AGRICULTURE AND FOOD CHEMISTRY, Vol. 15, No. 5, Sept.-Oct. 1967: pp. 938-939]

Identification of the Aldrin Artifact

J. R. Pearson, F. D. Aldrich, and A. W. Stone

Electron-capture gas chromatography is not specific for organochlorine pesticides. A material which behaves like aldrin when chromatographed on a DC-200 column or QF-1–DC-200 mixed column has been found in reagents and soil samples and identified by x-ray emission spectroscopy as elemental sulfur. Suggestions for its removal from reagents and the handling of samples containing it are included.

One of the most popular detectors for gas-liquid chromatography (GLC) of pesticides is the electron-capture (EC) detector, because it is very sensitive and relatively specific. Since this detector is not entirely specific for pesticides, many laboratories employ a second method, such as microcoulometry, to assist in identification of the pesticides. A silver cell is used for chlorine-containing pesticides and a platinum cell for those containing sulfur.

Because of the sensitivity of the electron-capture detector, reagents used in the preparation of the sample must be free from materials which give interfering peaks on GLC–EC. Lee *et al.* (1966) have reported an artifact in reagents which behaves as BHC or aldrin during GLC–EC and identified it as di-*n*-butyl phthalate. Sans (1967) also reported spurious responses in reagents. We have found a material in anhydrous sodium sulfate, Florisil, and hexane which behaved similar to aldrin on GLC–EC. The quantity of this material varied among lots of the same reagent and, in contrast to the findings of Lee *et al.* (1966), simple distillation did not remove the artifact. However, refluxing over bright metallic sodium yielded hexane that was more suitable for GLC–EC than the highly purified product obtained commercially. This interfering material was also present on cleaned glassware, regardless of the detergent used for cleaning.

During routine determinations of chlorinated hydrocarbon pesticides in soils, a sample was encountered which contained enormous quantities of material which behaved in the same manner as the aldrin-like material found in our reagents. A sufficient quantity was obtained by crystallization. Its identification is the subject of this paper.

EXPERIMENTAL

All gas-liquid chromatography was carried out on Micro-Tek gas chromatograph, Model MT-220. Coulometry was done with a Dohrmann microcoulometer Model C-200. The chromatograph columns were 6-foot × ¼-inch O.D. glass U-tubes filled with equal parts of 13% QF-1 on Gas Chrom Q and 8% DC-200 on Gas Chrom Q or with 10% DC-200 on Anakrom ABS. The column oven was operated at 190° C. and the EC detector at 200° C. The nitrogen carrier gas flow was 150 cc. per minute. Under these conditions, aldrin eluted in 3.0 and 2.7 minutes, respectively. These columns were used because they represent two types of columns currently in use in the pesticide residue field.

Ten grams of soil was placed in a washed extraction thimble and extracted under reflux with acetone-hexane (1:1) for 4 hours. The extract was concentrated under vacuum and transferred to a column made of 30 grams of aluminum oxide (Merck) previously deactivated with 10% water. One hundred milliliters of hexane served for elution. The eluate was concentrated under vacuum and transferred to a Florisil (Floridin Co.) column. Four hundred milliliters of 15% ethyl ether (containing 2% ethanol)–85% hexane was used for elution. The eluate was concentrated under vacuum for GLC–EC analysis. These two column fractionation steps are required to clean the soil extracts sufficiently for analysis. It appears that impurities not removed by one column are removed by the other.

RESULTS

When the Florisil eluate was concentrated, crystals formed in the flask. They were filtered off and recrystallized from hexane. Formation of crystals from a Florisil eluate is highly unusual.

A sample of these crystals was dissolved in hexane and subjected to gas-liquid chromatography, using the electron-capture detector and both the chlorine and sulfur titration cells on the microcoulometer. On GLC–EC, the material gave three peaks with retention times relative to aldrin similar to those obtained for pure sulfur (Figure 1). The solution was diluted so that a measurement could be made on the largest peak. No response was obtained on the microcoulometer chlorine titration cell. Responses obtained on the sulfur titration cell are very close to those obtained for pure sulfur (Figure 1). Retention times given for the sulfur titration cell are relative to sulfenone.

A sample of the recrystallized material melted at 114–16° C. on a Köfler micro-melting point hot stage. The melting point for pure sulfur varies from 106° to 119° C. (Heinrich *et al.*, 1961), depending on the crystalline form and the speed of heating. Another sample of the crystals was subjected to x-ray emission spectroscopy. The observed angle of the reflected x-rays (2θ) was 144.6°. The wavelength of this reflected beam was calculated as 5.372 A. from Bragg's formula. The wavelength for the $K\alpha$ transition for sulfur is 5.373 A. (Powers, 1957).

DISCUSSION

The identity of the material having an aldrin-like response on GLC-EC has been established as elemental

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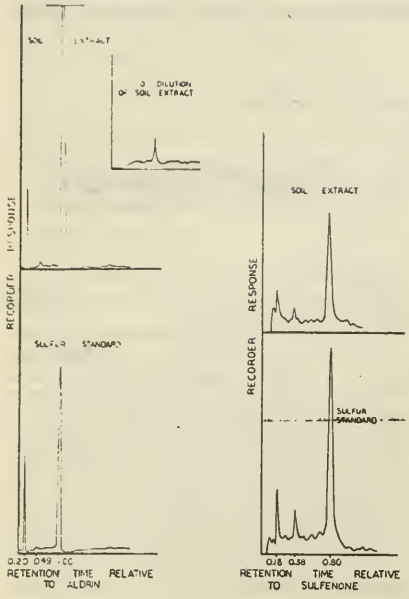

Figure 1. Behavior of sulfur on GLC

Chromatograms on the left were obtained when the respective materials were injected on the 13% QF-1–8% DC-200 column and the column effluent monitored with an electron-capture detector. Other chromatograms resulted from injection of the samples on the 10% DC-200 column and monitoring the column effluent with the microcoulometer sulfur titration cell. Aldrin would have a retention time relative to sulfenone of 0.80 on the latter column if the chlorine cell had been used

sulfur. The specifications for free sulfur in some of the reagents currently used is not in disagreement with this finding. Three forms of sulfur may be present to give the three peaks on GLC-EC. The peak occurring near aldrin is the largest and that near BHC is the smallest. The two smaller peaks usually are not seen because of dilution of the sample before injection.

Sulfur is widely used as a fungicide and thus it is not surprising to find large quantities in some soil samples from agricultural areas. However, if it is present, neither aldrin nor BHC can be determined accurately by GLC–EC unless some additional procedure is carried out, such as that suggested by Sans (1967). Indication that such an additional procedure is required would be a positive response at the retention time for BHC or aldrin with the microcoulometer chlorine titration cell.

A practical solution to the problem of impure reagents in our laboratory has been to purchase commercial "85% purity" hexane in large quantities and distill it over bright metallic sodium. (Note. Sodium is very reactive and due caution must be exercised in its use with a flammable solvent such as hexane.) Preshipment samples of Florisil and anhydrous sodium sulfate are obtained and analyzed before purchase is made. All glassware is rinsed thoroughly with redistilled hexane before use. Soil samples which appear to contain aldrin are subjected to critical microcoulometric analysis and if aldrin still is suspected, further steps are taken to verify its presence.

ACKNOWLEDGMENT

We thank W. D. Guenzi, U.S. Department of Agriculture, Fort Collins, Colo., for permission to publish his soil extraction method. We are indebted to W. A. Nixon and B. J. Wiginton, Marathon Oil Co., Denver Research Center, for the x-ray spectroscopy and interpretation.

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Received for review March 23, 1967. Accepted May 29, 1967. Research supported by the Pesticides Program, National Communicable Disease Center, Bureau of Disease Prevention and Environmental Control, Public Health Service, U.S. Department of Health, Education and Welfare, Atlanta, Ga., 30333, under Contract No. PH 86-65-62. Names of commercial manufacturers and trade names are provided for identification only. Their mention does not constitute endorsement by the Public Health Service or by the U.S. Department of Health, Education and Welfare.

Senator MONDALE. Dr. Porter, you are an employee of the Shell Development Co., are you not?

Mr. PORTER. Yes.

Senator MONDALE. And that company produces and sells aldrin?

Mr. PORTER. Yes, that is right.

Senator MONDALE. Does the Shell Development Co. have any activities or spend any funds in an effort to protect farmworkers' health and safety in the use of aldrin?

Mr. PORTER. In the past, they have conducted experiments in conjunction with Government people.

Senator MONDALE. Are there any efforts underway now by your corporation?

Mr. PORTER. None that I am aware of, no.

Senator MONDALE. I assume if workers are exposed to aldrin in sufficient quantities, it could be dangerous?

Mr. PORTER. Yes.

Senator MONDALE. What sort of things could happen to an employee who is exposed to excessive quantities of aldrin?

Mr. PORTER. I am afraid that is out of my field, I am not a toxicologist.

Senator MONDALE. Do they have anybody on the Shell Co. staff that deals with the problem of health risks to employees?

Mr. PORTER. Yes, definitely. We have toxicologists at Woodstock Laboratories in England that have done a great deal of work with aldrin and dieldrin doing studies on chronic and acute, measurements of metabolic fate. There is a great deal of information available on the toxicology of aldrin and dieldrin.

Senator MONDALE. Does the Shell Co. have any of those efforts underway in the United States?

Mr. PORTER. At the present time?

Senator MONDALE. Yes.

Mr. PORTER. Yes; and I am really not familiar enough with that area to be able to tell you where it is.

Senator MONDALE. You testified that to be really sure about the existence and the amount of aldrin one needs an expensive piece of equipment called a mass spectrograph, is that correct?

Mr. PORTER. Yes.

Senator MONDALE. Does the FDA use a mass spectrograph in identification of pesticide residues?

Mr. PORTER. Yes; they do.

Senator MONDALE. Did they do so on these tests?

Mr. PORTER. I would not be able to say, I am not familiar.

Senator MONDALE. In the materials presented by Senator Murphy, it said they use the gas chromatograph.

Senator MURPHY. Would the Chairman yield for a moment? These were materials that were presented to me, these are not my materials. I want the record to show these are a series of reports sent in by laboratories which I put into the record, these are not my materials. I would like the record to be clear on that. I am not a chemist.

Senator MONDALE. I am glad the Senator clarified that. What I meant to say was that these materials which you, Senator Murphy, presented in the record.

Senator MURPHY. Yes.

Senator MONDALE. This is a memorandum from Dr. C. C. Johnson, administrative director of CEPHAS in HEW, in which he makes certain conclusions about the existence or nonexistence of aldrin, and the test he refers to in these documents, gas-liquid chromatography. Now, would it be your testimony that if HEW does not use this $40,000 piece of equipment to which you have referred, that these tests by the FDA would not be reliable?

Mr. PORTER. Well, this mass spectograph is perhaps the ultimate in being able to say that you have a compound present. The other techniques that I mentioned, chemical reactions, the thin-layer chromatography, the microcoulometric detectors and so forth, could also be used.

Senator MONDALE. They used a gas-liquid chromatography method. Would you find that adequate if the FDA dealt properly with the tests?

Mr. PORTER. If they said that there was no aldrin present, I would say that it is adequate. As I said in the text, the absence of a peak is a good indication that nothing was there.

If a peak is present, you can't be sure that it is aldrin.

Senator MONDALE. As I understand it, the FDA, England laboratories, Eastawai laboratories, Strasburg and Seigel laboratories, none of them use this expensive piece of equipment that you are talking about. Would you say that most laboratories do not use the test that you are referring to in your testimony?

Mr. PORTER. I think it is right that most laboratories do not use that piece of equipment.

Senator MONDALE. Now, the California Department of Agriculture recommended paper chromatography—you are a chemist, aren't you, George?

Senator MURPHY. I got the lowest mark ever given in chemistry in the Yale Sheffield Scientific School without being kicked out.

Senator MONDALE. And microcoulometric gas chromatography.

Mr. PORTER. Yes.

Senator MONDALE. So that it would be fair to say that the kind of equipment that you say is necessary to assure that there are no doubts, is equipment that is rarely used.

Mr. PORTER. That is true and quite often you will find that pesticides are reported on the strength of gas-liquid chromatographic evidence alone or supported by paper chromatography and these are doubtful if the history of the sample is not known. If you have good reason to believe that the compound is there, most people are willing to believe it at that, but if you have no reason to believe that the compound should be present, you should view with great suspicion anything that was determined by just these methods.

Senator MONDALE. Did I understand you to say that it is impossible to find aldrin without also finding dieldrin?

Mr. PORTER. I didn't say it was impossible. I said that because the aldrin converts so rapidly I don't remember of a case where we have found aldrin in a sample that we didn't also find dieldrin.

Senator MURPHY. Would the Chairman yield for a question?

Senator MONDALE. I would be glad to.

Senator MURPHY. If aldrin was applied in California and these grapes were purchased in a market in Washington, what sort of transformation would have taken place during the normal period of time the grapes have to be transported from California to Washington and placed on the market here? Would that have made a definitive difference in the condition?

Mr. PORTER. I don't think so. We have made studies of the storage stability of the residues on samples because, of course, we have to bring in samples from great distances sometimes from our field test and we always freeze them at the field, take them to our laboratories in the frozen condition and maintain them hard frozen until we actually analyze them, but against the chance that the samples thaw, we run stability tests to find out how the residues change just standing on the shelf. When they are out of the sunshine, the aldrin residues are stable and don't change appreciably over quite long periods of time.

Senator MONDALE. The reason I asked the aldrin-dieldrin question is that in the materials submitted in the Congressional Record by Senator Murphy, that were submitted to him by the Department of HEW, on page S. 9866, FDA reports show they found aldrin, but no dieldrin on 61 samples of grapes in fiscal year 1968. In other words, FDA has found aldrin without finding dieldrin.

Would that indicate that these studies might be inadequate?

Mr. PORTER. At what level of concentration?

Senator MONDALE. Traces—0.01 to 0.03.

Mr. PORTER. In the case where traces are listed, it is my understanding that it is simply a gas chromatographic tracing and the full identification procedure has not been used but you would have to go to the FDA, I think, for confirmation.

Senator MONDALE. Are you personally familiar with any of the specific tests, that have been earlier referred to, undertaken by England laboratories or the Eastawai laboratories at the request of Safeway, or the farmworkers? Are you familiar with what was handled there, the nature of the sample, or what steps were taken?

Mr. PORTER. I am not familiar with any of the details of the analysis. I saw the report forms.

Senator MONDALE. Now in the light of that, can you state on the basis of your professional background, that there could not have been aldrin on those grapes?

Mr. PORTER. No. I would not be able to state that.

Senator MONDALE. No further questions.

Senator Murphy?

Senator MURPHY. I have only one question.

If aldrin was in fact present on those grapes that were sent to the England Laboratories, what would be your explanation of the presence of the aldrin and the amount that they found? Have you any explanation in view of the fact that you have testified that a particular vineyard that was supposed to produce these grapes has not used aldrin? How would it get there?

Mr. PORTER. If it hypothetically were present on the grapes, I would say that it would have to have gotten on them in the course of transit from the field.

Senator MURPHY. Now in your testimony you mentioned something that happens with plastic bags. If those grapes had been placed in a plastic bag, under certain light conditions, could that have produced the amount of aldrin that was found on the grapes by the England laboratory?

Mr. PORTER. It could have contaminated them with the plasticizer which could be mistaken for aldrin.

Senator MURPHY. Is that plasticizer dangerous?

Mr. PORTER. Well, one that I am familiar with that is an interference is di-normal-butyl phthalate. That to my knowledge is not dangerous. There are the polychloro-biphenyls, chlorinated biphenyl compounds which are used as plasticizers and some of which could be mistaken for aldrin, that are toxic and comparable to DDT.

Senator MURPHY. Would that have produced aldrin in the amount that was supposedly found by the England laboratories?

Mr. PORTER. Pardon me?

Senator MURPHY. Would this exposure be able to produce aldrin in the amount that was found by the England laboratory—18 parts per million?

Mr. PORTER. Could the plastic bags have contaminated to that extent?

Senator MURPHY. Yes.

Mr. PORTER. I would consider that unlikely.

Senator MURPHY. Thank you.

No further questions.

Senator MONDALE. If I might just ask one question to clarify this.

Is it your testimony that the only way that aldrin could have gotten in these grapes is through confusion with plasticizing, or do you have another possibility?

Mr. PORTER. No. The plasticizer, what I was saying was that the analysis report could have been erroneous and the person doing the test may have actually gotten a signal from the plasticizer from the bag.

Senator MONDALE. In the England case prepared for Safeway, as I recall Dr. Windlan's testimony, these samples were taken out of the plastic bag, and out of the warehouse, and out of the freight cars.

What about the possibility of drift? Now I think it is significant to point out that although it is your testimony that there is no aldrin on these grapes, many tests of these grapes including England labs, Eastawai labs and Bianco's own lab reports, and those of FDA over the years, showed these grapes to have aldrin. How did it get there? Could it possibly be drift or other possibilities?

Mr. PORTER. First of all, the aldrin was reported in all these cases. My personal opinion is that it was not aldrin because it is so improbable that aldrin would be there.

Senator MONDALE. In other words, you are saying even FDA, in finding traces of aldrin in the past, in your opinion identified something other than aldrin?

Mr. PORTER. That is correct, because in this case, you see, at such low levels that they didn't do the confirmatory test.

Senator MONDALE. This is an exceedingly esoteric field.

Mr. PORTER. But don't let me say what the FDA did, because I don't know.

Senator MONDALE. I want you to expound on my question about drift. In other words, suppose the——

Senator MURPHY. Would the gentleman explain drift?

Senator MONDALE. That is what we are doing in the Senate all the time. [Laughter.]

As I understand it, some pesticides are sprayed, by airplanes, some are sprayed by tractor booms, but the booms have to be fairly high in order to clear the grape vines or other plants. It is not unusual for these pesticide residues to get picked up in the wind and drift from the fields to elsewhere.

Mr. Chavez has reported that on occasion, when sprayers come to the end of a field, they will even spray a community because the airplane is not that accurate. Is that a possibility, do you think?

Mr. PORTER. I am certain that it is not a possibility to the extent of 18 parts per million on grapes, because applying aldrin directly to grapes at levels that it was at least two times to four times higher than recommended levels, you don't get more than a tenth or two-tenths of a part per million. This is because the grape berries are partly hidden by the foliage, the inner berries are protected from the spray by the outer berries and the weight of berry per unit of berry surface is very high. So in the direct spraying immediately after you have sprayed you go in and harvest the grapes and you will find only tenths of a part per million on the grapes themselves.

Drift, I don't think, would account for residues of that magnitude, or even significant magnitude in the grapes.

Senator MONDALE. Senator Cranston.

Senator CRANSTON. Is dieldrin used on the grapes?

Mr. PORTER. It is my understanding that it is used for climbing cut worm early in the season before the berries have begun to develop.

Senator CRANSTON. Are other chlorinated hydrocarbons used on the California grapes?

Mr. PORTER. I am really not up on that.

Senator CRANSTON. In terms of its ability to poison the human system, what is the difference between aldrin and dieldrin?

Mr. PORTER. Well, by oral ingestion very little, because aldrin is converted in the animal to dieldrin and the metabolic products and other features are very similar. But as I said, I am not a toxicologist and there may be fine details that I am not aware of.

Senator CRANSTON. You testified that aldrin changes into dieldrin. Does this mean there is usually some aldrin residue in dieldrin?

Mr. PORTER. Pardon me?

Senator CRANSTON. You testified that aldrin changes or transforms into dieldrin.

Mr. PORTER. Yes.

Senator CRANSTON. Does that mean that there will be some aldrin residue in dieldrin?

Mr. PORTER. No, the reverse transformation is not known to

take place in any situation exposed to the atmsophere and sunshine and on leaves. In some situations, in cultures of microorganisms, dieldrin has been seen to be reduced to aldrin, but this has only been reported in two occasions. It is very unlikely.

Senator CRANSTON. You mentioned aldrin's use as a soil insecticide. Would you describe how and when it is used as a soil insecticide?

Mr. PORTER. It is not to my knowledge used on grapes, but it is used in quite large quantities on corn and it is distributed as granules on the ground and incorporated into the soil in various ways. Sometimes it is applied as a broadcast treatment to fields on all varieties of crops. I am not sure what crops are labeled for aldrin use.

Senator CRANSTON. I assume that aldrin in the soil, changes. Is that a correct assumption?

Mr. PORTER. In the soil, changes?

Senator CRANSTON. Yes.

Mr. PORTER. Yes, it will.

Senator CRANSTON. How long does the dieldrin remain in the soil?

Mr. PORTER. Well, it varies a great deal depending on the temperature, the amount of water, the amount of microorganism activity and so forth. About half of whatever is there will disappear between 6 months and a year's time and this is pretty consistent. It is generally proportional to the amount that is present so that a given fraction of it will disappear in a given time regardless of the amount that is actually present.

Senator CRANSTON. Half disappears in 6 months. What about the other half?

Mr. PORTER. It continues to decline and the actual amount in the soil will depend on how often you have applied it and what time has elapsed since it was applied, and the various things of this sort. It would eventually disappear completely if it were not treated.

Senator CRANSTON. Thank you very much.

Senator MONDALE. Senator Schweiker.

Senator SCHWEIKER. Thank you very much Mr. Chairman.

In your testimony. Doctor, you said on page 7, "On thin-layer chromatography sulphur is developed in a number of solvent systems very close to aldrin and can be mistaken for it."

Was this the type of system that the labs used to detect it? I am not clear on who used what system.

Mr. PORTER. The Food and Drug Administration generally uses thin-layer chromatography as a confirmatory test, according to their manual. The England Laboratory that reported yesterday used paper chromatography. I think paper chromatography is inferior to thin-layer chromatography.

Senator SCHWEIKER. You say it is inferior?

Mr. PORTER. Yes, particularly for aldrin, because on the paper chromatographic system aldrin is hardly moved and it is not a very selective test for aldrin.

Senator SCHWEIKER. You also mention that the best types of equipment are in the $30,000 to $40,000 range. Would that be available to FDA, or at NIH for example?

Mr. PORTER. Yes.

Senator SCHWEIKER. Mr. Chairman, I just would like to suggest that to solve the mystery, we might consider redirecting tests based on using this sophisticated equipment that seems to be a lot less debatable than the other equipment we have.

Senator MONDALE. Senator Schweiker, I am glad you brought this up. Let me say what I thought this hearing was about. Basically, we are trying to determine the nature of the risk, and what can be done to prevent the risks to the health of the farmworkers in the field, from a worker health and safety perspective, as opposed to the esoteric problems of identification of pesticides. The reason we are kicking this dead horse around, whether there was, or was not, some aldrin on grapes, is that the charge was made that the Union came in here with false information. I think it is abundantly clear that they took an honest sample to an honest laboratory, and came over to our hearing with an honest report finding aldrin.

Now the reports could be wrong. That is a scientific field. I don't think we have been sent to the U.S. Senate to become chemists and rule upon such erudite subjects. But I do think we have a duty to find out whether we have been used to sponsor false testimony, and that is all I think we should be involved with. At least that is my judgment.

Senator MURPHY. Would the Chairman yield?

Senator MONDALE. Gladly.

Senator MURPHY. Since I was the one that asked for the reopening of these hearings, I disagree we are kicking a dead horse. I think it is expressly important because the claim of danger to workers in California grapes has done a great deal of harm to the industry, to the workers in industry, to the growers in the industry, and I thought it was very important that we find out, if in truth, dangerous pesticides were being used in this proportion and, if so, then this committee should act immediately to see that these are not used.

Now if the testimony shows that this particular pesticide has not been used, and I think the testimony was that it has not been used in 3 years, and it suddenly appears on grapes in Washington, I am extremely interested to know how it got there and whether it was a misreading of the chemical analysis, or how the pesticide got there and for what purpose. I think it is very important because I think this is the basis of this particular phase of the hearing, to find out whether we are getting the facts or not.

Senator MONDALE. Well, of course, two parties brought grapes to the laboratories: One, the farmworkers; and the second was Safeway Stores. Both parties found aldrin on the grapes. Now I don't know whether there was aldrin or not, and I don't propose to become a chemist and find out, but the thing that caused me to want this hearing on this particular issue was the Congressional Record statement by Senator Murphy that:

> The grapes presented to the England Laboratory had somehow achieved strange qualities which I find very difficult to explain. And it seems possible that a subcommittee of the U.S. Senate has been the victim of duplicity.

Now that error has to be cleared.

Senator MURPHY. I think so, and that is why we are having this hearing. I have not heard anybody yet testify as to how 18 parts per

million, which would be very dangerous, got on those grapes. I have heard that people say they have not used this particular pesticide and what we are trying to find out here, as I understand it, is whether there was a misreading of the chemical analysis, which varied.

Certainly the exhibits that were available to me, and I put them all in, showed a great variance, and I don't see why, in such an exact science, there should be such a great variance if this was properly approached. I am just curious to know, this is not a question of accusation.

Senator MONDALE. I think some might take it as such. When you say that "this tactic on the part of the United Farm Workers is a vicious type of deceit," they might take that personally.

Senator MURPHY. Where do you see that?

Senator MONDALE. Here, from your remarks in the Congressional Record, which I introduced into this hearing record yesterday.

Senator MURPHY. I may have to apologize. I didn't intend it in that manner, and I think the Chairman knows this. But I did intend that we find out exactly whether or not these are the facts, or not the facts. So far as I have listened to the testimony, one laboratory says that they found aldrin to a degree that was dangerous, the FDA says that they found no aldrin or only traces, and the testimony this morning says aldrin was not used.

Now, I don't say it was there or was not there. I am interested if it was not used, and not been used, how did it get on those grapes. This is my whole point.

Senator MONDALE. Well, I am glad to see that the nature of this hearing has now changed, and that it was not intended to imply deceit or dishonesty on someone's part. If someone is deceitful, one wonders whether that charge rests against the farmworkers or Safeway. They both took samples to the laboratories, and the laboratories found aldrin. Now if somebody is deceitful, presumably it is both the supermarket and the farmworkers, and if the charge of deceit is going to be dropped——

Senator MURPHY. That is your presumption and not mine. Mr. Chairman.

Senator MONDALE. Fine. Mr. Giumarra, who is going to testify, said this is a false pesticide scare, and a——

Senator MURPHY. I didn't hear his testimony.

Senator MONDALE (continuing). Traveling sideshow, the charges are false, great threat to the American consumer, and so on.

Senator MURPHY. May I ask what the Chairman is reading from? I have not got that.

Senator MONDALE. This is a handout of the press release by Mr. Giumarra. I shall order it printed at this point in the record.

(The material referred to follows:)

GRAPE GROWERS REFUTE CHARGES OF CESAR CHAVEZ ON PESTICIDES

WASHINGTON, D.C., Sept. 29—Two major California table grape growers today charged Cesar Chavez and the United Farm Workers Organizing Committee with mounting a false pesticide scare to cover UFWOC's failure to organize the nation's farm workers and to sustain a sagging grape boycott effort.

Speaking for their industry, John G. Giumarra, Jr., and Anthony A. Bianco, Jr., said Chevez' pesticide campaign and his charge that California growers are poisoning the American people would be totally repudiated in testimony today and tomorrow before the Senate Subcommittee on Migratory Labor. The growers, as well as officials of the State of California and technical experts on agricultural pesticides, are in Washington to appear before the Subcommittee.

Giumarra, general counsel for Giumarra Vineyards Corporation of Edison, and Bianco, president of Bianco Fruit Corporation of Fresno, issued this statement at a news conference at the National Press Club:

"It is somewhat unusual in advance of a legislative hearing to comment on testimony the committee will hear. But we of the table grape industry have had to listen for too long while Cesar Chavez has misled the American people and the Congress.

"Mr. Chavez has come to Washington to testify before the highest legislative body in the land in an effort to use this revered place as the staging ground for a traveling sideshow which he had hoped would whip the farmers and stores of the nation to their knees.

"Mr. Chavez and his representatives have appeared before Congress and in the marketplaces of the country to charge that California table grapes are contaminated by pesticides. The hearings today and tomorrow will prove that those charges are false, and that they have been deliberately raised as a tactical weapon in a losing battle.

"They will prove that Mr. Chavez is the greatest threat to the American consumer in the history of agriculture and his pious trumpeting of the pesticide charge will be shown for what it is—a bogeyman campaign to keep his failing 'La Causa' alive.

"On August 1, the Subcommittee on Migratory Labor heard Jerome Cohen, UFWOC general counsel, charge that Mr. Bianco's grapes contained 18 parts per million of the pesticide aldrin, a level far in excess of permitted tolerances. His charge was based on a laboratory analysis purporting to be of Mr. Bianco's grapes purchased in a Washington store. Then, with a broad brush but no specifics, he painted a black picture of growers poisoning farm workers and the American consumer.

"Senator George Murphy of California then questioned Mr. Cohen's charges, pointing out that government and private investigations of grapes and their purity failed to substantiate Mr. Cohen's claims. Senator Murphy called Mr. Cohen's testimony 'possible duplicity' and asked that the hearings be reconvened to get at the facts.

"The hearings today and tomorrow will clearly establish those facts. Spokesmen for the table grape industry, chemical manufacturers and federal and state agencies will appear before the committee. Their testimony will pin the 'big lie' label on the UFWOC pesticide campaign.

"Evidence will show that Mr. Cohen's charge is false because aldrin is not even used on grapes in California.

"Evidence will show that UFWOC launched the pesticide scare only to shore up its sagging boycott and that its stated concern for the farm worker and consumer is no more than another cynical weapon in its arsenal of trickery and deceit.

"Evidence will be presented that Mr. Chavez himself opposed launching the poison scare until all else failed, and that UFWOC was willing to use the pesticide charge as a throw-away issue at the bargaining table.

"The Subcommittee will also hear of harassment and terror on the farms, of firebombings and arson, and of the mysterious spraying of a tear gas type chemical in an effort to force workers from the field.

"And when the evidence is in, we think the script of Mr. Chavez' travelling sideshow which will roam the East and Midwest over the next few weeks will have to be rewritten.

It will have to be rewritten because Mr. Chavez has failed in his last desperate attempt to grab control of the nation's food production. California table grapes are being harvested, shipped and marketed and the American public is buying them. UFWOC has failed to stop the consumer from exercising his freedom of choice in the market place just as it has failed to stop the farm worker from going into the vineyards.

"It is about time that if Mr. Chavez and UFWOC really wanted to help the farm worker that they join with responsible agriculture, with members of

Congress and with concerned consumers in seeking federal legislation to provide orderly procedures for union organizing and collective bargaining on the farm. If he believed in consumers' rights he would call off his boycott and respect their right to decide for themselves what they wish to buy or not to buy.

"Agriculture across the country is supporting fair and responsible legislation while Mr. Chavez has only said 'no' to every proposal. Instead of using the Congress for a sideshow, it it time for Mr. Chavez and UFWOC to partake in the democratic process and work with all concerned to achieve a real solution to the farm labor controversy."

Senator MONDALE. I would like to see this be a rational hearing on the exposure of farm workers to pesticide poisoning. That is how it all began, but since two things were said, one that the farm workers were sponsoring deceitful information, and secondly, that by implication that this committee was sponsoring the same sort of material, I thought it was important to clear the air.

I would say up to this point we have not heard one hint that the farm workers or Safeway did anything but the honest thing. They took grapes to the laboratory for testing and found aldrin.

Senator MURPHY. Pardon me, Mr. Chairman. Yesterday there was a suggestion that there might have been a misreading by the laboratory report by the England laboratories, and now we have heard an expert say that if you do it in a certain fashion you could very easily be misleading and come to erroneous conclusions, that unless you do a complete testing with certain instruments which probably were not available or may not have been available in England but were available to the Food and Drug, we have a different scientific opinion here.

Senator MONDALE. That is right, but——

Senator MURPHY. Let me finish.

Now there is a difference of opinion between the England Laboratory and the Food and Drug Administration. I merely want to find out if there was aldrin to this degree. That is my only question.

Senator MONDALE. Would you not say that that question is an entirely different one than the question of probing the deceit of the farm workers? In the last statement, you said the laboratories might not know what they are doing.

Senator MURPHY. That is not true. I have not charged anybody with deceit. If I have, if that is the meaning that the Chairman has read in—and I didn't understand that my statement was on trial here in this form and I resent the implication—then if that is the case I make no charge against anyone. I am here to find out whether or not testimony was given to this committee in an effort to deceive the committee, whether it be by England or by Mr. Porter or by the United Farm Workers, or whoever. This is my whole purpose, and I think that is fairly clear.

Senator MONDALE. I received a letter from you on August 19, 1969, requesting these hearings, and in the letter you refer to the FDA and other materials that appear to attempt to mislead the subcommittee by presentation of false evidence.

Now I find that a very serious charge. I don't like to be misled and I am sorry you resent it, but it is your language.

Senator MURPHY. May I say this: This is a personal letter from me to the chairman of the committee. Is that right? Is that what it is?

Senator MONDALE. And it was released to the press, which makes it somewhat public.

(The news release referred to follows:)

NEWS RELEASE FROM THE OFFICE OF SENATOR GEORGE MURPHY, CALIFORNIA

Sacramento, Calif., August 20—Sen. George Murphy, R.-Calif., citing Food and Drug Administration reports refuting Senate testimony that California table grapes contain harmful levels of the pesticide aldrin, called today for a farm union official to repeat his charges under oath.

Murphy has stated that 60 tests of table grapes across the country by the FDA showed no trace of aldrin. He termed the August 1 testimony of Jerome Cohen, general counsel of the United Farm Workers Organizing Committee, before the Sub-Committee on Migratory Labor "possible duplicity."

The senator said he wrote Sen. Walter F. Mondale, D.-Minn. the Subcommittee chairman yesterday, requesting hearings be reconvened and Cohen and others be questioned under oath.

"The conclusion is clear," Murphy said. "The grapes presented (by UFWOC) . . . had somehow achieved strange qualities which I find very difficult to explain. And it seems possible that a Subcommittee of the U.S. Senate has been the victim of duplicity.

"If this be the case—the tactic on the part of the United Farm Workers Organizing Committee is a vicious type of deceit and makes clear the witness has raised the pesticide question as part of UFWOC's 'rule or ruin' methods.

"If duplicity be the case," he said, "it seems to me these people should be cited for contempt of congress."

In his letter to Mondale, Murphy said Cohen, Manuel Vasquez. UFWOC representative in Washington; and FDA representatives and other scientists should be required to give sworn testimony about aldrin content in grapes.

The senator said statements from the agricultural commissioner of Kern County and the operator of the Kern vineyards where the grapes cited by Cohen were produced proved there had been no aldrin application. He said the vineyard operator, Anthony J. Bianco, had not used aldrin in any form on his properties in six years.

Murphy added: "Obviously, the union has raised the pesticide issue in an effort to further harass the grape industry and in furtherance of their design to force the grape growers to force their workers to join a union which they do not wish to join. I believe they have gone too far in this case and that this deplorable story will show the UFWOC effort up for what it really is."

Murphy said the pesticide issue pointed up in "clear and concise evidence" the need for federal legislation to resolve farm labor problems.

He said a law growing out of his Senate-introduced Consumers' Agricultural Food Protection Act would "offer the protections for proper organization and collective bargaining, while safeguarding the farmer against loss of his crop and possibly his farm and guaranteeing the flow of food from farm to market.

"This pesticide specter raised by UFWOC is just another argument in favor of such legislation," he said.

The UFWOC pesticide charge was leveled in Cohen's unsworn testimony and claimed table grapes purchased at Washington supermarkets contained 180 times the human tolerance level of aldrin, a chlorinated hydrocarbon used against grasshoppers. Cohen presented a report from the C. W. England Laboratory of Washington, D.C., noting 18 parts per million of aldrin in the grapes tested. Legal limit is .10 parts per million.

The England Laboratory, Murphy told the Senate last week, said the grapes tested were provided by Vasquez, and were not purchased by the laboratory.

FDA's 60 tests, showing no trace of aldrin on any sample, included grapes from markets in New York, Los Angeles, Chicago and Washington-Baltimore and storage lots from San Francisco.

(The allegations referred to also appeared in the Congressional Record of August 12, 1969, which follow:)

[Excerpts from the Congressional Record, Aug. 12, 1969]

ALDRIN RESIDUE ON TABLE GRAPES

Mr. MURPHY. Mr. President, I think it is important that the RECORD show, and the American people be aware of, what seems to be a shocking attempt to mislead the public by the presentation of false evidence to the Subcommittee on Migratory Labor.

On August 1, 1969, Jerry Cohen, general counsel for the United Farm Workers Organizing Committee—UFWOC— appeared before that subcommittee and testified that two bunches of Thompson seedless grapes contained quantities of the chemical Aldrin which were 180 times the established tolerance level for human beings. Mr. Cohen submitted a laboratory report from C. W. England Laboratory, of Washington, D.C., showing an aldrin content of 18 parts per million compared with the legal tolerance level of .01 part per million.

The England Laboratory, in later comments to the news media, said that the grapes they tested had been presented to them by a representative of the UFWOC and were not purchased directly or obtained from any market directly by the laboratory.

After this testimony the Food and Drug Administration, at the request of subcommittee Chairman MONDALE, has conducted tests of table grapes in markets across the country. It obtained 60 samples, including 48 from retail outlets in New York, Chicago, Los Angeles, and the Washington-Baltimore area. It also sampled 12 carlots in the San Francisco market.

The Food and Drug Administration report shows there was no Aldrin residue on any grapes. It also shows there was no chemical residue of any nature on any grape sample that approached the human tolerance level. I ask unanimous consent that the report of the Food and Drug Administration be printed in the RECORD.

There being no objection, the report was ordered to be printed in the RECORD, as follows:

(Material inserted in the RECORD by Senator Murphy appears in full detail earlier in this hearing record.)

* * * * * * * * * *

Mr. MURPHY. Mr. President, the grapes presented to the England Laboratory were taken there by Manuel Vasquez, the Washington district representative of the United Farm Workers Organizing Committee. They were purchased, Mr. Cohen said in his testimony, from Safeway Stores in Washington.

Mr. Cohen said the grapes were produced by "Bianco." That would be Anthony A. Bianco, Jr., and Bianco Fruit Corp. of Delano, Arvin, and Thermal. Mr. Bianco has not used aldrin in any form on his properties in the past 6 years. He has filed statements to this effect from his professional pesticide applicator and supplier and from himself.

I ask unanimous consent that the statements of Mr. Bianco and of Mr. Sampson, his pest control applicator, be printed in the RECORD, together with a report of tests conducted on grapes from the Bianco Ranch by the BC Laboratories of Bakersfield, Calif.

There being no objection, the statements were ordered to be printed in the RECORD, as follows:

* * * * * * * * * *

Mr. MURPHY. Mr. President, Seldon Morley, the Agricultural Commissioner of Kern County, Calif., in which Mr. Bianco does the bulk of his grape production has submitted a statement that there has been no commercial application of Aldrin in any grapes in Kern County. I ask unanimous consent that Mr. Morley's statement be printed at this point in the RECORD.

There being no objection, the statement was ordered to be printed in the RECORD, as follows:

* * * * * * * * * *

Mr. MURPHY. Mr. President, the last grapes shipped by Mr. Bianco from the Coachella Valley were cleared by the Federal FDA Inspector C. R. Lewis—No. 319—and went to Texas on July 13. No Coachella Valley grapes could

have retained salable quality until late July when the grapes in question had to be purchased.

Pesticide chemists have found that aldrin converts very rapidly to the chemical dieldrin appearing within 6 or 7 hours after aldrin application in the fields. Dr. Paul E. Porter, the assistant to the director of physical sciences for the Shell Development Co., biological research center in Modesto, Calif.—a division of the only firm manufacturing aldrin—reports it would take an application of 10 to 15 pounds of aldrin per acre to achieve a level of 18 parts per million immediately after spraying. The normal application, as approved by the California Department of Agriculture, is one-fourth pound per acre.

But this is moot. Aldrin is not used on grapes in Kern County—as Mr. Morley specifies—and normal application of the pesticide in California is confined to soil as a grasshopper combatant. Although no aldrin was used, grapes showed up 3,000 miles away in Washington containing a massive dose of aldrin.

Dr. Porter reports aldrin converts rapidly to dieldrin while exposed to sunlight—with only negligible amounts of aldrin remaining after 6 days. To achieve 18 parts per million, aldrin would have to be sprayed directly on the grapes just before shipment. And as the agricultural commissioner of Kern County has stated, aldrin is not used on grapes in that county.

The conclusion is clear: The grapes presented to the England Laboratory had somehow achieved strange qualities which I find very difficult to explain. And it seems possible that a subcommittee of the U.S. Senate has been the victim of duplicity.

If this be the case—this tactic on the part of the United Farm Workers Organizing Committee is a vicious type of deceit and makes clear the witness has raised the pesticide question as part of UFWOC's "rule or ruin" methods.

"Rule or ruin" is not my phrase. It is the statement of a dozen table grape growers who tried to negotiate a contract with UFWOC. The negotiations failed because the United Farm Workers Organizing Committee refused—in the statement's words—to bargain in good faith.

These growers exposed "the pesticide issue" in its true light by citing a statement written last July 3 by the United Farm Workers Organizing Committee and addressed to the Federal Mediation and Conciliation Service. Here is the pertinent part of that statement:

That we are prepared to give a moratorium to the whole industry on the pesticide campaign for a limited time in exchange for an acceptable contract covering all workers, all crops.

This might be considered a new type of biological blackmail.

Mr. President, I believe the true purpose of UFWOC in raising the pesticide issue was well set forth in a conversation which Jerome Cohen had with Mrs. Eleanor Schulte, office manager for the South Central Farmers Committee in Delano, Calif., on June 10, 1969. I ask unanimous consent that a memorandum from Mrs. Schulte concerning this conversation be printed at this point in the RECORD.

There being no objection, the memorandum was ordered to be printed in the RECORD as follows:

* * * * * * * * * *

Mr. MURPHY. Mr. President, obviously the union has raised the pesticide issue in an effort to further harass the grape industry and in furtherance of their design to force the grape growers to force their workers to join a union which they do not wish to join. I believe they have gone too far in this case and that this deplorable story will show the UFWOC effort up for what it really is.

One of the contributing factors in this entire unfortunate affair has been the contrived confusion, built on propaganda, half truths, and, in some cases, outright falsehood. I intend from now on to check all witnesses for creditibility, character, and purpose, so that the subcommittee may make proper and productive pronouncements as a result of these hearings.

Senator MONDALE. In any event, that is one of the reasons we held these hearings, in order to probe whether——

Senator MURPHY. In any event, let's say I was mistaken and I would like to get on with the hearing, if I may. I say for the record

I make no accusations. I am not in the habit of accusing without enough information and knowledge. I have been around some time now, and the reason I asked for this hearing was to make certain that this committee was getting the facts of the matter.

Now that is cleared up, I would hope that we could get on with the hearing and if the chairman has any complaints against any procedure or my habits or what I have done in the past, I think maybe we ought to take it up at a different time.

Senator MONDALE. I am very fond of Senator Murphy and I have no complaints.

Senator MURPHY. Thank you.

Senator MONDALE. Any other questions?

Our next witness is Mr. Allen B. Lemmon of the California Department of Agriculture.

Mr. Lemmon, if you will come to the witness chair.

STATEMENT OF ALLEN B. LEMMON, ASSISTANT DIRECTOR, CALIFORNIA DEPARTMENT OF AGRICULTURE

Mr. LEMMON. My name is Allen B. Lemmon, and I am assistant director of the California Department of Agriculture. Mr. Jerry Fielder, the director of agriculture, asked me to express his appreciation to the chairman for the invitation to appear on August 1 and again at this time, and his regret that he was not able to appear, because of other commitments, in the short time involved. So he asked that I be here at this time to try to present information.

May I explain my background? I am a graduate of Stanford University with an A.B. in engineering in 1930, and degree of engineer in 1932.

I have been employed continuously by the California Department of Agriculture since 1933. My first asignment was the inspection of fruits and vegetables for spray residues, and I have been interested in the protection of the public through enforcement of California pesticide laws ever since that time. During the period 1946 to 1956 I served as chief of the bureau of chemistry of the California Department of Agriculture. In 1956 I became chief of the division of plant industry and have continued in this capacity. In 1968 I was designated assistant director of agriculture covering plant industry and other work as assigned by the director.

On August 1, 1969, our director of agriculture, Mr. Jerry W. Fielder, sent you a description of our California pesticide regulatory program. With this was included an article authored by me and published in "Residue Reviews" (vol. 6, 1964) that fully describes the details of our complex, comprehensive pesticide regulator program.

On September 17, 1969, in response to a request from the chairman of this committee, Director Fielder sent you a letter responding to three questions that were asked. If there is any further response that I can provide you, Director Fielder has instructed me to do so.

I request your consent to make these three documents a part of the hearing record.

Senator MONDALE. Without objection, so included.

(The documents referred to all appear in the record of the August 1, 1969, subcommittee hearing.)

Mr. LEMMON. I would like to point out that our comprehensive pesticide regulatory program in California covers not only the licensing of the pesticides themselves but the licensing of the pest control operators with special examination for those serving as pilots to apply pesticides from aircraft. We have also classified 35 materials as injurious materials that require a permit before an individual may use the materials. These include materials such as parathion and DDT.

The reason that we are able to enforce this type of program is that in each county in California there is a county agricultural commisssioner who has an extensive staff of county employees that are in the field at all times and know what goes on in the various agricultural production areas. These men are trained inspectors and are distinct from the Agricultural Extension Service. The agricultural commissioners, deputies, and inspectors are law enforcement officers enforcing the laws set forth in the agricultural code and the rules and regulations adopted by the director of agriculture under the authority of this code.

A close, cooperative working relationship exists between the California Department of Agriculture and the California Department of Public Health. The public health department's Bureau of Occupational Health and Epidemiology, under the direction of Dr. Thomas Milby, is conducting a study of the effect of pesticides on farmworkers. Dr. Milby told me last Friday that he had no results to report as the study was in the process of interviewing 2,000 persons. From the testimony that Mr. Chavez gave yesterday, it is apparent the United Farm Workers Organizing Committee has talked with one of the many persons conducting interviews for Dr. Milby. I am sure this is why Mr. Chavez was unable to obtain any authoritative information.

Senator MONDALE. Would you yield there.

As I remember Mr. Chavez' testimony yesterday, he had about four pages of specific examples. Do you intend to deny the authoritative nature of those examples?

Mr. LEMMON. No. I am pointing out that in the study the public health department is making they are interviewing people to gather information with regard to what tests they should make in diagnosis of farrmworkers rather than to have the farmworkers diagnose themselves.

Senator MONDALE. You have seen or heard Mr. Chavez' statement. Do you know of any facts in there that you disagree with, or have information that would justify you in dismissing it as inaccurate?

Mr. LEMMON. I don't have the statement in mind. As I went through and listened to him there were one or two items that I recall that I had a question about, particularly with regard to this problem of getting information from the regulatory agencies pertaining to use of pesticides.

As I further point out in my statement it is the policy of the

department of agriculture to provide a worker or his physician or his attorney any information, if there is a problem of illness involved, that he possibly has in order to aid diagnosis and treatment.

Senator MONDALE. I think Mr. Chavez was referring to finding information about when, and in what way, and with what kinds of chemicals, the field is sprayed so that the workers could protect themselves. Do you provide that kind of information freely to the farmworkers?

Mr. LEMMON. In our office we do not have that information.

Senator MONDALE. Is it freely available to them?

Mr. LEMMON. No, it is not freely available because the information that is available is summaries prepared by county agricultural commissioners in some counties at the end of the year showing what was used.

Senator MONDALE. So if the farmers wanted to protect themselves in field A and would like to know what kinds of chemicals were were sprayed, and at what times, and so on, the farmer won't tell them. To your knowledge there is no source to which they can go in a legal way to obtain that information?

Mr. LEMMON. If there is an injurious material used on a farm, the regulations require the farmer to tell the worker, if he asks, what was used.

Senator MURPHY. Will the Chairman yield for a question?

Senator MONDALE. Yes.

Senator MURPHY. Do I understand you to say that only if the worker asks; in other words, if there has been an injurious material sprayed, is there no notice, is there no public display of any danger signal as to the length of time the pesticide is used, so that the worker may have a chance of ascertaining the conditions existing in that field?

Mr. LEMMON. If parathion, EPN, and one or two other materials of that type, are used at the rate of over 1 pound 1 acre, then the law requires that they post the property with a sign indicating the date of treatment and what it was treated with, and how long the worker should stay out of the property, or how long people should stay out. So it is where high level treatments are applied that there is a requirement that property be posted.

Senator MURPHY. In your experience, would you say that the farmers generally pay attention to this, or are they neglectful and do they sometimes forget to post the property as the law requires?

Mr. LEMMON. I think the farmers have attempted to comply with the law. In general, applications are less on most crops than 1 pound per acre, therefore posting is not required. In those cases where greater amounts are required for control of a particular pest on a particular crop, the properties are posted.

Senator MURPHY. Thank you very much.

Thank you, Mr. Chairman.

Senator MONDALE. Well, if it is working so satisfactorily why did Dr. Irma West in an article appearing in Archives of Environmental Health in July 1964 state that:

In California the agriculture industry experiences the highest occupational disease rate, over 50 percent higher than the industry in second place, and almost three times as high the average rate of all industries.

If it is working so well, why does Dr. West find such widespread examples of occupational diseases arising from occupational pesticides?

(The articles referred to appear elsewhere in this hearing record.)

Mr. LEMMON. Dr. West was able to have statistics from first doctor reports in California and they have been tabulated annually up through 1967, showing injuries to workers and others involved in agriculture where chemicals may be involved.

I do not know of other places in the United States where such information is available. In California this complete information was set forth and allows us to follow up and try to make corrections where we find that there are problems involved, and this is the purpose of the injurious materials law that was passed in 1949 and has been amended from time to time since it was first enacted.

Senator MONDALE. Proceed.

Mr. LEMMON. Another example of Public Health's interest in cooperation is the information the Department has distributed to physicians in California on pesticides particularly organic phosphate diagnosis and treatment. Public Health also has provided such material to any physician requesting it.

In addition to regulation of the sale and use of pesticides, the Department maintains laboratories where samples of fruits, vegetables, hay, meat, milk, and other raw agricultural commodities used for food purposes are analyzed. These samples are drawn from fields or lots in the course of being harvested or transported or in the wholesale markets or in retail outlets. This spray residue inspection program is statewide and is for the purpose of assuring that the produce offered for sale to the consumer complies with the spray residue requirements set forth in the Federal and State laws and regulations. Routine testing of produce enables us immediately to hold and require reconditioning of any produce that may be found with residue in excess of the permitted tolerance.

The samples of grapes that have been drawn in the routine process of our work have not shown any grapes with spray residues in excess of the permitted tolerance. In no case have we found any aldrin on grapes. In response to a report on September 11, 1969, that signs were being displayed in front of a Purity Store in San Francisco alleging that the grapes for sale were poisoned, we drew four samples of the grapes on hand, analyzed them, and found that they did not carry any pesticide residue in excess of the tolerance. Only one sample carried any residue, and that was kelthane 0.6 parts per million, well within the legal tolerance of 5 ppm.

In California each agricultural pest control operator is required to submit a monthly report to the county agricultural commissioner in each county in which he does work showing the work that was done in that county. The records that are submitted to the agricultural commissioner enable him to determine if there have been misapplications and take proper action against a pest control

operator or other person who was involved. I have personally contacted several of the agricultural commissioners including the Commissioner of Riverside County and the Commissioner of Kern County, and have been informed that their records do not show the use of any aldrin on table grapes in their counties. In checking with other counties, I have been informed that they have no records of the use of aldin upon grapes.

Senator MONDALE. Would you yield there?

Is that information public?

Mr. LEMMON. I am making my statement public now.

Senator MONDALE. Is the information about pesticides used by commercial applicators filed by the county agriculture commissioners available, for example, to the farmworkers or this committee?

Mr. LEMMON. The particular individual reports that are filed by the pest control operators are not public, because they would include information that would permit a competitor to make a list of the customers of the operator. The information that is on the reports in Kern County, for example, was summarized at the end of the year and provided those that were interested giving a total summary of each pesticide used in that county.

Senator MONDALE. Are you satisfied with that policy underlying the law?

Mr. LEMMON. We have not been able ourselves to get a method of tabulating so we could distribute all of the information statewide. As I mention further on in my statement, the amendments to the law in 1969 and through the use of a computer, we believe we are going to be in a position to provide much better information than we have in the past.

Senator MONDALE. We are talking about this information which is apparently available only in a place where the farm workers can not go to find out what pesticides are being used, and by what commercial applicators in the field.

You say that information is not public. If the farm workers want it they can not obtain it. Is that correct?

Mr. LEMMON. No, they can go to the farmer and ask what was used.

Senator MONDALE. Can he get it from the county agricultural commissioner? That was my question.

Mr. LEMMON. He can not see the reports with regard to the operators that are filed. He can ask on a particular farm it it was treated, and he will get a response.

Senator MONDALE. I asked if the county agricultural Commissioner can turn over the information at the request of the farmworkers.

Mr. LEMMON. No, we are under court order from the court in Kern County.

Senator MONDALE. The answer is no, you can not.

Mr. LEMMON. Yes.

Senator MONDALE. How then were you able to obtain this information off those records, and disclose it here today?

Mr. LEMMON. The individual reports are not those that are put out, but the information on them with regard to use is available.

Senator MONDALE. Do these county agriculture commissioner reports include information on the application of pesticides by noncommercial application?

Mr. LEMMON. The pest control operator reports only carry the information with regard to what is applied by them.

Senator MONDALE. So where a farmer puts on his own pesticides, that does not appear with the agriculture commission, is that correct?

Mr. LEMMON. That is correct.

Senator MONDALE. What percentage of the pesticides applied would you say are self-applied?

What percentage are applied by commercial applicators?

Mr. LEMMON. Estimated on the overall statewide basis, all pesticides, 70 percent is put on by pest-control operators, roughly 30 percent by individual farmers. It varies a little within the range of 70 percent to 80 percent, according to different crops.

Senator MONDALE. So that if the farmer does not cooperate with the farmworker in telling him about the pesticides, the farmworkers could not obtain the information from the county agricultural commissioner because they won't give it to him, and even the 30 percent of the information is not available, because it is not even required to be filed with the agriculture commission, would that be correct?

Mr. LEMMON. That is partially correct. I point out if it is injurious material that the farmer is applying, for which he has to get a permit from the commissioner, the permits are public information.

Senator MONDALE. Does he have to get a permit for DDT?

Mr. LEMMON. Yes.

Senator MONDALE. You may proceed.

Senator MURPHY. May I ask a question?

Senator MONDALE. Yes.

Senator MURPHY. I want to make one point that I am not clear on. In other words, if a farm worker called upon the farmer and asked for the information, or asked the commission, he can't get the information on what particular farm?

Mr. LEMMON. You can get it on one particular farm with regard to DDT, for example, if you ask, because that is an injurious material and the farmer has to get a permit and the permits are public information.

Senator MURPHY. One other question: With regard to the 30 percent of the farmers, I understood you to say 30 percent do their own spraying and their own application. Now with regard to the produce from those farms, they are subjected to the same tests and scrutiny as the other farms and the public marketplace by your commission, is that correct?

Mr. LEMMON. That is correct.

Senator MURPHY. Thank you.

In other words, my point was that the farmer who is the self-applicator, if he was negligent it is safe to assume that he would be able to find this out very quickly through a general test, is that a proper statement?

Mr. LEMMON. Yes.

Senator MURPHY. Thank you.

Senator MONDALE. Have you completed your statement.

Mr. LEMMON. No, I have some more.

Senator MONDALE. You may proceed.

Mr. LEMMON. For the record, I would like to submit the statements of the Agricultural Commissioner of Riverside and Kern County attesting the fact that aldrin is not used on grapes.

Senator MONDALE. Without objection, so ordered. We will print your entire statement, together with the attachments, at the close of your remarks.

Mr. LEMMON. California's pesticide laws and regulations have emphasized protection for persons, animals, and crops. The 1969 legislature has given the Department of Agriculture the added responsibility of protecting the environment. The law has been amended to require registrants of the pesticides classified as injurious materials to render quarterly reports of sales to the director. It also requires each agricultural commissioner to report to the director the type and amount of injurious materials for which permits are issued and the crop and pest or pests on which the material is used. The contents of these reports are required to be summarized quarterly by the director as to the type of material and amounts and such summaries are to be made a public record.

If there are any questions that I can answer, I will be pleased to have the opportunity to do so.

Senator MONDALE. Senator Cranston.

Senator CRANSTON. Could you explain exactly what pesticides are used on California grapes.

Mr. LEMMON. There is quite a long list of them that are used according to the season and the pest involved.

Senator CRANSTON. Could you submit for the record, Doctor, what they are?

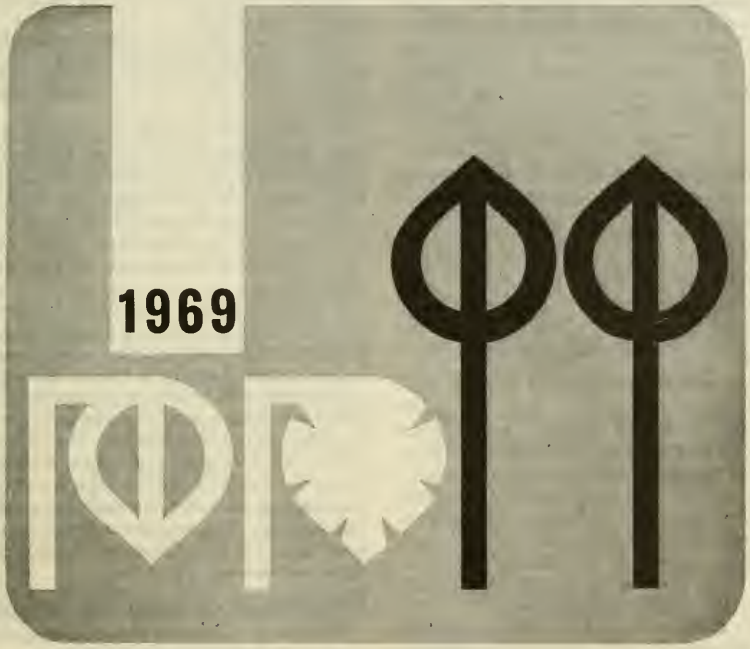
Mr. LEMMON. I can give you a copy of the publication of the University of California with regard to their recommendations for pest control on grapes.

Senator CRANSTON. If you will submit that for the record, it would be helpful.

Mr. LEMMON. All right, sir.

(The document referred to follows:)

Division of Agricultural Sciences
UNIVERSITY OF CALIFORNIA



pest and disease control program for

GRAPES

CALIFORNIA AGRICULTURAL
Experiment Station
Extension Service

Introduction

The following pest control program is based upon research investigations carried out by University of California personnel in the Agricultural Experiment Station and Agricultural Extension Service, in cooperation with the State Departments of Agriculture and Public Health, Fish and Game, the U.S.D.A., and the agricultural and chemical industries.

This program has been developed on a statewide basis, but special problems of control in local situations have been noted and apply only to the area designated. Controls for the major problems are given, but these may not be present in every area. Use only that portion of the program that is applicable to your area.

Warning on the Use of Chemicals and Suggestions for Proper Use

Pesticides are poisonous and always should be used with caution. The following suggestions for the use and handling of pesticides will help minimize the likelihood of injury, from exposure to such chemicals, to man, animals and crops, other than the pest species to be destroyed.

Always read all precautionary labeling directions before using sprays or dusts and follow them exactly. Notice warnings and cautions before opening the container. Repeat the process every time, no matter how often you use a pesticide, or how familiar you think you are with the directions. Apply material only in amounts and at times specified.

Personal safety—Avoid inhaling sprays or dusts. When directed on the label, wear protective clothing and a proper mask.

Never smoke, eat, or chew while spraying or dusting.

Application—Do not use the mouth to siphon liquids from containers or to blow out clogged lines, nozzles, etc.

Do not spray with leaking hoses or connections.

Do not work in the drift of a spray or dust.

Confine chemicals to the property being treated and avoid drift by stopping treatment if the weather conditions are not favorable.

Do not apply pesticides over fish ponds, canals, streams, or lakes, and do not apply them to fields being irrigated if drain water runs off field.

Cover food and water containers when treating around livestock or pet areas.

Observe label directions and follow recommendations in order to keep the residue on edible portions of plants within the limits permitted by law.

Decontamination—Should pesticides be accidentally spilled on the skin or clothing remove contaminated clothing *immediately* and wash the contaminated skin thoroughly.

Bathe and change to clean clothing after spraying or dusting. If it is not possible to bathe, wash hands and face thoroughly and change clothes. Also wash clothing each day before re-use.

In case of illness—If symptoms of illness occur during or shortly after dusting or spraying, call a physician or get the patient to a hospital *immediately*.

Disposal of empty containers—Always dispose of empty containers so that they pose no hazard to humans, animals, valuable plants or wildlife.

Storage—Keep pesticides out of reach of children, pets, irresponsible persons, and livestock. They should be stored outside the house, away from food and feed, and under lock and key.

Always store sprays and dusts in their original containers and keep them tightly closed. *Never* keep them in anything but the original container.

Working in treated areas—If pickers or others are working in trees or crops with heavy foliage, such as peaches, olives, citrus, etc., or in grapes that have been treated with highly toxic compounds, be sure the recommended interval between the treatment and entrance into the treated area is observed. These workers should follow the same precautions as given for the applicators in regard to changing clothing, wearing protective clothing, eating or smoking, and bathing. If a worker becomes ill while working under these conditions, call a physician immediately.

Regulations on Injurious Materials

Twenty-one pesticide chemicals are designated as injurious materials and their use is subject to special restrictions under the regulations of the State Department of Agriculture. A permit from the County Agricultural Commissioner must first be obtained:

- When calcium arsenate, standard lead arsenate, or copper acetoarsenite (Paris green) are to be used in dust form in excess of fifty pounds in any 24-hour period,
- When sodium arsenite is to be used, except when sold as a diluted ready-to-use syrup or dry bait for control of insects, snails, slugs, or rodents,
- When TEPP, parathion, methyl parathion, EPN, OMPA, Systox (demeton), Phosdrin (mevinphos), Thimet (phorate), Di-Syston, or Bidrin are *used in any form or quantity*,
- When chloropicrin is used in Merced, Orange and Ventura counties for field fumigation of soil, except when used in a quantity of twelve pounds or less in any 24-hour period.

- When DDT, DDD, dieldrin, endrin, heptachlor, or toxaphene are used for agricultural applications in more than 50 pounds of dust, granules, bait, one gallon of liquid, or four pounds of wettable powder, in any 24-hour period.

It is unlawful to sell or deliver an injurious material to any person who is required to have a permit to use such material unless the person or his agent signs a statement that he has a valid permit to use the material.

Pesticides Hazardous to Honey Bees and Other Beneficial Insects

Many pesticides are highly toxic to honey bees and other beneficial insects. The farmer, the beekeeper, and the pest control industry should cooperate closely to keep losses of beneficial insects to a minimum. Certain pesticides are more toxic than others to these insects; therefore whenever possible use the material that is least toxic. When bees are present, the safest time and method of application of pesticides should be employed. Avoid drift of pesticides onto bee colonies or nearby crops and weeds in bloom. Do not contaminate bee drinking water. For further information and advice concerning the use of pesticides around honey bees, see University of California Agricultural Extension Service One-Sheet Answer No. 170 Rev. entitled "Toxicity of Pesticides to Honey Bees."

Phytotoxicity

Certain chemicals may cause plant injury when used at the wrong stage of plant development or when temperatures are too high. Injury may also result when excessive dosage rates, wrong formulations, or incompatible pesticide combinations are applied. To avoid injury, follow recommendations precisely.

Pesticide Residues

New materials and formulations continually appear and these will be included in the recommendations only after they have been properly registered, proven effective and that the registered use when applied under California conditions as directed will not result in a residue that exceeds the legal tolerance.

These suggestions for pest control are based on the best information currently available for each pesticide listed. If followed carefully, they should result in satisfactory control and should not leave residues that will exceed the tolerance established for any particular chemical on this crop. To avoid excessive residues on the harvested crop, follow directions explicitly with respect to dosage levels, number of applications, and minimum interval between application and harvest.

THE GROWER IS RESPONSIBLE for residues on his own crop as well as for problems caused by drift from his property to other properties or crops.

Drift of Pesticides

Drift of pesticides is by far the most important cause of illegal residues on forage crops. No pesticide can be applied by either aerial or ground equipment without some drift occurring; however, less drift occurs from a ground application than from an aerial application, and dusts cause a greater drift problem than sprays.

Drift can be kept to a minimum and the contamination to forage crops reduced if certain precautions are observed in the selection of the pesticide, method of application, type of formulation (dust, spray, or granular), timing of treatment, wind direction and velocity, and the distance between the point of application and the nearest forage crop downwind.

It is the responsibility of the farmer and the applicator to consider the above points before applying a pesticide. For most pests, this program offers several alternatives for control. The pesticide which will best meet the requirements for a safe application in respect to surrounding crop, animal farming operations, beneficial insects and wildlife should be selected.

University Policy for Making Pest Control Recommendations

Pest control recommendations made by University of California personnel are based upon those materials for which there are specific data regarding effectiveness under California conditions, residues that will remain on the crop at harvest, phytotoxicity, and wherever possible their effect upon beneficial predators, parasites, honey bees, fish and other wildlife. Recommended chemicals must also be registered and labeled for use both by the United States Department of Agriculture and the California State Department of Agriculture.

Wildlife

To protect fish and other wildlife, do not apply pesticides over canals or streams and do not allow drainage from treated fields to enter waterways immediately after application. Special precautions regarding protection of wildlife species will be given, when necessary, in the remarks column immediately following the recommendations.

Special Problems of Processed Crops

Some processors will not accept a crop treated with certain chemicals. If your crop is going to a processor, be sure to check with the company representative before making pesticide applications.

GRAPES

Pest, disease or purpose	Material and formulation	Amount of material per 100 gals.	Amount of material per acre	Remarks
		I DORMANT STAGE		
A. Zinc Deficiency (Little Leaf)	Zinc Sulfate (36% zinc)	1 lb. in 1 gal. water		Pruning should be timed so that little or no bleeding occurs. Swab the fresh pruning wounds of spur-pruned vines with this solution as soon as possible after pruning but within one-half day. See Section V for cane-pruned varieties.
B. Grape Mealybug	Parathion* E.C. (4 lbs./gal.) plus Dormant oil	1–1¼ pints plus 2 gals. oil		Apply at 200 gals. per acre. NOTE: Do not combine parathion-oil with the black measles- and dead arm-sodium arsenite spray. Parathion may be combined with sodium arsenite. This combination gives better coverage and better kill than parathion alone. Note CAUTION below regarding the use of sodium arsenite when combining these materials. Use the higher dosage where grape mealybug infestations are severe and persistent. Do not use more than 2½ lbs. actual parathion per acre during the dormant period.
C. Black Measles and Dead Arm	Sodium Arsenite* (4 lbs. arsenic trioxide per gal.)	3 qts.		CAUTION: Sodium arsenite can kill grape spurs, arms, and often much of the vine unless care is taken to assure proper application. Grapevines should be pruned before spraying. Make spray applications at least 4 or more weeks after pruning. This length of time between pruning and spraying is needed to permit closing of pruning wounds. Spray should always be applied before bud

				break. CAUTION: Sodium arsenite is caustic and poisonous; therefore, when spraying, wear protective clothing and apply a protective grease to exposed skin of the hands and face. Sodium arsenite is recommended for dead arm in vineyards with severely diseased canes on the vines. For good control of dead arm this dormant spray should be followed by an application of captan at bud swell. See Section II-B. For control of grape mealybug, black measles or dead arm, spray vines during winter and 4 weeks after pruning, up to bud break. Apply at the rate of 200 gals. per acre. Heads of vines and arms of cordons should receive thorough spray coverage. High spray pressure is not necessary or desirable—use 100–200 psi.
		II BUD SWELL STAGE		
A. Cutworms, Bud Beetles and Click Beetles	1) DDT* 50% WP		2 lbs.	Apply when damage is first observed, and preferrably by ground at 25 to 50 gals./acre.
	2) DDT* EC (2 lbs/gal)		1½ gals.	Apply in 10 gals. of water per acre by aircraft.
	3) Carbaryl 5% Bait (Sevin)		10 lbs.	Refers to Sevin on apple pomace bait that is applied in banded treatments.
B. Dead Arm	Captan 50% WP	1½ lbs.		Apply at bud swell. In severe cases apply the dormant sodium arsenite spray (Section I-C) above and follow it with the captan spray. For mild cases of dead arm use the captan spray alone. This spray applied when the buds begin to break affords protection for the first 6–8 nodes of the developing shoots. If dead arm is

* Use requires permit from Agricultural Commissioner.

Pest, disease or purpose	Material and formulation	Amount of material per 100 gals.	Amount of material per acre	Remarks
				severe and late rains are forecast it may be advisable to apply a second captan spray when the shoots average 6–8 inches in length. Occasionally leaf damage has resulted from captan. It has not been serious, nor has there been injury to the clusters.
	III AFTER GROWTH STARTS			
A. Willamette Mite	1) Demeton* 26% (Systox)		1 pt/10 gal. (by air) 1 pt/50 gal. (by ground)	Treatments should be made when the basal leaves of the new growth show damage.
	2) Dicofol 35% WP (Kelthane)		1⅓ lbs/75 gals.	
	3) Carbophenothion 25% WP (Trithion)		1 lb/75 gals.	
B. Thrips	1) Azinphos methyl 3% dust (Guthion)		20–25 lbs.	Apply at first signs of damage. Repeat applications may be necessary.
	2) Optional Materials Parathion* 2% dust		20–25 lbs.	Repeat applications may be necessary where resistance has not occurred.
	DDT* 10% dust		20–25 lbs.	
C. Variegated Grape Leafhopper	1) Carbaryl 50% WP (Sevin)		2 lbs.	Prebloom treatment 14 days after appearance of leafhoppers. Apply by ground rig in 25–50 gals. per acre.
Overwintering Adults (So. Calif)	2) Demeton* 26% (Systox)		1 pt.	

	3) Optional Materials Malathion 57%		1 qt.	
	Dioxathion 4E (Delnav)		1½ pts.	Allow 7 days for kill.
	4) Carbaryl 5% dust (Sevin)		20–25 lbs.	
	5) Malathion 4% dust		20 lbs.	Use only if temperatures are above 80° F.
D. False Chinch Bug	1) Chlordane 5% dust			A pest in some years only, the false chinch bug is associated with London rocket, or with wild mustard and other weeds. Disk these weeds under 3–4 weeks before vines leaf out. Apply to ground around the vineyard outside the spread of border vines. This will stop the migration of false chinch bugs into the vineyard.
	2) Parathion* EC (4 lbs/gal)		1 pt.	Apply by aircraft in 10 gals. per acre.
	3) Parathion* 25 WP	2 lbs.		Apply as ground coverage spray.
E. Eradication of ungrafted, unwanted rootstock vines	D-D or Telone soil fumigant, 1 ounce per injection site			Apply with a manual soil injector at a depth of 6–8 inches in the soil close to the trunk. Use 4 to 8 injection sites around the base of the trunk, depending on vine size. Complete before growth interferes.
	IV SHOOTS 6 INCHES LONG			
Powdery Mildew	Sulfur dust		10 lbs.	The first three dustings are very important, Sections IV, V, and VI-A. Dust each vine thoroughly from at least two sides. If powdery wildew has been difficult to control, apply the eradicant spray, Sec. VI, B.

* Use requires permit from Agricultural Commissioner.

Pest, disease or purpose	Material and formulation	Amount of material		Remarks
		per 100 gals.	per acre	
	V SHOOTS 12 INCHES LONG			
A. Powdery Mildew	Sulfur dust		10 lbs.	Dust each vine thoroughly.
B. Zinc Deficiency	1) Zinc sulfate (36% zinc) plus spray lime	4 lbs. 3 lbs.		Spray so as to wet lower leaf surfaces and young flower clusters as much as possible.
	or any zinc product sold for foliage spraying			According to manufacturer's directions. In severe cases repeat 2 weeks after bloom.
C. Hoplia	Parathion* 2% dust		15–20 lbs.	These beetles are a pest in the San Joaquin Valley. They appear early and may defoliate the vines in a short time.
	VI SHOOTS 18 INCHES LONG			
A. Powdery Mildew	Sulfur dust		10 lbs.	If one of the first three dustings is omitted, apply the eradicant spray under Section VI-B.
B. Powdery Mildew (Eradicant Spray)	Wettable sulfur plus a good wetting agent, such as Triton B-1956	1½ lbs.	3 lbs.	If any one of the first three dust applications is omitted an eradicant spray should be applied. This spray should also be used for powdery mildew eradication when for any reason mildew has not been held in check with a sulfur dust. Care must be taken to wet all green surfaces thoroughly. Use 200 gals. of spray per acre.
	VII SHOOTS 24 INCHES LONG AND EACH 14 DAYS THEREAFTER TO HARVEST			
Powdery mildew	Sulfur dust		10 lbs.	Apply dust every 14 days in each row middle or every 7 days in alternate middles. Sulfur can cause injury to foliage when applied just before

		or on days when the temperature exceeds 100° F. The need for sulfur dust applications after blossom shatter time varies with the season, district, variety and use of crop. Consult your University of California Farm Advisor for local recommendations.
VIII SHOOTS ABOUT 15 TO 20 INCHES LONG (Clusters should average 3–4 inches in length, and may range from 2–5 inches)		
To loosen compact bunches of seeded varieties	Gibberellins [including gibberellic acid and potassium gibberellates in ppm (parts per million)]	Thorough coverage of cluster area necessary. This will require approximately 100 gals. of spray per acre.
	1–2½ ppm	Tinta Madeira Palomino
	2½–5 ppm	Carignane Valdepenas Aleatico
	5–10 ppm	Zinfandel Petite Sirah
IX EARLY MAY TO EARLY JUNE		
A. Grape Leafhopper 1st brood nymphs (Northern California)		LEAFHOPPER POPULATION LEVELS ON THOMPSON SEEDLESS FOR WINE OR RAISINS ONLY. Low leafhopper populations do not need treatment. A low population is ten (10) nymphs or less per leaf on those leaves with most evident feeding.

* Use requires permit from Agricultural Commissioner.

Pest, disease or purpose	Material and formulation	Amount of material		Remarks
		per 100 gals.	per acre	
				BIOLOGICAL CONTROL Experience has shown that if the parasitic wasp, Anagrus, is found to be active on the eggs of the first brood, the first treatment for leafhopper control may be withheld. Parasite activity is indicated by leafhopper eggs that have turned red.
	SPRAY TREATMENTS For use of sprays after fruit formation see remarks in Section XII, Summer.			
	1) Endosulfan 50% WP (Thiodan)	1 lb.		Use 200–300 gals. per acre. Do not treat within 7 days of picking.
	2) Optional materials Dioxathion 47% EC (Delnav)		1 qt.	Spray application. Do not make more than one application at this rate after berries begin to form. Do not apply less than 30 days before harvest.
	Carbophenothion 4F (Trithion)	½ pt.		Do not treat within 30 days of picking.
	Carbaryl 50% WP (Sevin)	1–1½ lbs.		No time limitation. Experience has shown that in certain areas the use of this material has resulted in mite increases.
	Ethion 25% WP	1–1½ lbs.		Do not treat within 30 days of picking.
	Malathion 25% WP	2 lbs.		Do not treat within 3 days of picking. Do not use malathion when temperatures are below 80° F. Use 200 to 300 gals. water per acre.
	DDT* 50% WP	2 lbs.		Do not treat within 40 days of picking.

DUST TREATMENTS

	1) Endosulfan 5% dust (Thiodan)		20–25 lbs.	Do not treat within 7 days of picking.
	2) Optional Materials: Carbaryl 5% or 10% (Sevin)		20–25 lbs.	Higher dosages and/or repeated applications of these materials may be necessary in some areas.
	Carbophenothion 3% (Trithion)		20–25 lbs.	
	Mevinphos 2% (Phosdrin)		20–25 lbs.	
	Naled 4% (Dibrom)		20–25 lbs.	
	Malathion 4%		20–25 lbs.	Do not use malathion when temperatures are below 80°F.
	DDT* 10%		20–25 lbs.	
B. Grape Leaf Folder (San Joaquin Valley)	1) Carbaryl 50% WP (Sevin)	1 lb.		Use 200 gals. per acre. Experience has shown that in certain areas the use of this material has resulted in mite increases.
	2) Carbaryl 5% dust (Sevin)		20–25 lbs.	May increase mite population.
	3) Standard lead arsenate	4 lbs.		Use 200 gals. per acre. CAUTION: Lead arsenate sprays can be used only early in the season against the first brood worms.
	4) Bacillus thuringiensis			Use 200 gals. per acre. Spray both sides of each row—spray tops of vines thoroughly. Complete coverage is necessary. Run the duster also between every row. Direct discharge of dust toward top of vines.
	Thuricide 90 TS	1 qt.		
	or			
	Biotrol BTB 183-25 WP	2 lbs.		
	or			
	Biotrol BTB 2.5 dust		20–40 lbs.	

* Use requires permit from Agricultural Commissioner.

Pest, disease or purpose	Material and formulation	Amount of material per 100 gals.	Amount of material per acre	Remarks
C. False Chinch Bug	Chlordane dust or parathion* spray	(Refer to Section III-D for recommended applications)		
		X BLOOM		
A. Grape Thrips and Flower Thrips	1) Azinphosmethyl 3% dust (Guthion)		20–25 lbs.	This is an occasional problem on certain varieties of table and/or cannery grapes. Where scarring has been experienced, treatment may be warranted.
	2) Optional materials DDT* 10% dust		20–25 lbs.	Apply in early bloom when the caps begin to fall. Repeated applications may be necessary. Use DDT only where resistance has not occurred.
	Parathion* 2% dust		20–25 lbs.	
B. To decrease set resulting in less compact clusters, and to increase berry size of the Thompson Seedless variety.	Gibberellins (including gibberellic acid and potassium gibberellate).			
	San Joaquin Valley: 2½–20 ppm.			In the San Joaquin Valley apply when 30–80% of the caps have fallen. Concentrations higher than 20 ppm may cause shot berries.
	Coachella Valley: 20–50 ppm.			Apply at 95% bloom (that is when 95% of the caps have fallen). Use in conjunction with the postbloom spray.
C. To improve berry size of Black Corinth variety (Zante currant).	Gibberellins (including gibberellic acid and potassium gibberellate). 2.5–5.0 ppm.			Apply 3 to 5 days after full bloom but before shatter begins. Be sure to wet each cluster thoroughly.

XI POSTBLOOM

A. Variegated Grape Leafhopper (Southern Calif.)	1) Carbaryl 5% dust (Sevin)	20–25 lbs.	Avoid use of sprays after bloom because of possible spotting of fruit.
	2) Malathion 4% dust	20–25 lbs.	
B. Achemon Sphinx and White-Lined Sphinx	TDE (DDD) or DDT* 5% dust	30 lbs.	To prevent the migration of white-lined sphinx caterpillars into the vineyard apply 5% DDD dust in a deep furrow with the steep side of the furrow toward the vineyard. Use about 4 lbs. of dust per 100 linear feet.
C. To increase berry size of Thompson Seedless variety.	Gibberellins (including gibberellic acid and potassium gibberellate) 20–40 ppm		Apply after shatter following bloom (normal girdling time). More uniform results can be obtained when used in conjunction with girdling. Wet the cluster area thoroughly. To obtain the largest berries use both the bloom and shatter sprays. Apply no later than two weeks after shatter stage.
D. Powdery Mildew (eradicant spray)			If powdery mildew has developed in the vineyard, use the eradicant spray listed under Section V1-B with 1 lb. wettable sulfur and applied at the rate of 400–600 gals. per acre. Wash the foliage and fruit with this spray.

XII SUMMER

NOTE: Summer sprays may cause scarring which is of greatest importance on table varieties. Wettable powders are preferred to emulsifiable concentrates for sprays applied after the berries are formed. Wettable powders are less likely to cause injury to the fruit, but may cause objectionable deposits of powder on the berries as they reach full size.

A. Grape Mealybug	Parathion* flowable (4 lbs./gal.)	1 pt.		Use 300 gals. of spray per acre. APPLY in late June or early July. Much less effective than the dormant application listed in Section 1-B.
	or Parathion* 25% WP	2 lbs.		
	or Parathion* 2% dust		30–35 lbs.	

* Use requires permit from Agricultural Commissioner.

Pest, disease or purpose	Material and formulation	Amount of material		Remarks
		per 100 gals.	per acre	
B. Grape Leafhopper (Northern Calif.)				LEAFHOPPER POPULATION LEVELS ON THOMPSON SEEDLESS FOR WINE OR RAISINS ONLY
				Low leafhopper populations do not need treatment. A low population is five (5) nymphs or less per leaf on those leaves with most evident feeding. If the parasite **Anagrus** is present a low population is ten (10) nymphs (see Section I-X-A Biological Control).
	DUST TREATMENTS			
	Use dusts as given in Section I-X. Use no more than 30 lbs. per acre of 10% Carbaryl (Sevin) dust or 3% Carbophenothion (Trithion) dust. Use between 30–35 lbs. of the other dust materials.			
	SPRAY TREATMENTS			
	1) Endosulfan 50% WP (Thiodan)		3 lbs.	Do not treat within 7 days of picking.
	2) Carbophenothion 25% WP (Trithion)		2 lbs.	Do not treat within 30 days of picking.
	3) Carbaryl 50% WP (Sevin)		4–6 lbs.	No time limitation. Use may increase mite population.
	4) Ethion 25% WP		3–4½ lbs.	Do not treat within 30 days of picking or use more than two applications on fruit.
	5) Malathion 25% WP		8 lbs.	Do not treat within 3 days of picking.
	6) DDT* 50% WP		8 lbs.	Do not treat within 40 days of picking.
	7) Diazinon 50% WP		2 lbs.	Do not treat within 10 days of picking.
				Apply in 200 to 400 gals. of water per acre, depending upon vine growth density.

C. Variegated Grape Leafhopper (Southern Calif.)	(Use one of the dusts listed under Section X1-A. For postharvest use in Coachella Valley use Section XV-A materials.		
D. Pacific Mite and/or Willamette Mite			Treatments for Pacific Mite should be applied when an average of 4 or more leaves per vine show yellow spotting. This can take place any time after growth starts. Sprays are preferred for control but ground dusting may also be used. Do not use sprays on table grapes.
	SPRAY TREATMENTS		
	1) Dicofol 35% WP (Kelthane)	3–4 lbs.	Apply in 200 gals. of water per acre. Do not use within 7 days of harvest.
	or Dicofol 35 MF	1½ qts.	
	2) Tetradifon 25% WP (Tedion)	4 lbs.	Apply in 200–400 gals. of water per acre. Do not use more than twice during fruiting period. Mites may be resistant in some areas.
	or Tetradifon 4F	1 qt.	
	3) Dioxathion 47% EC (Delnav)	1 qt.	Apply in 200 gals. of water per acre. Do not make more than one application at this rate after berries begin to form. Do not apply less than 30 days before harvest.
	4) Optional materials: Demeton* 26% emulsion (Systox)	3 oz.	Apply these materials in 200–400 gals. of water per acre.
	TEPP* 20% liquid	½ pt.	Make two applications of TEPP at 5–7 day intervals. Mites may be resistant to both of these materials in some vineyards.

* Use requires permit from Agricultural Commissioner.

Pest, disease or purpose	Material and formulation	Amount of material		Remarks
		per 100 gals.	per acre	
	DUST TREATMENTS			
	1) Tetradifon 3% (Tedion)		35 lbs.	Do not use more than twice during fruiting period.
	2) Dicofol 3% (Kelthane)		30–40 lbs.	Apply with a ground duster. Do not use within 7 days of harvest.
	3) Carbophenothion 3% (Trithion)		30 lbs.	Mites may be resistant to all these materials in some vineyards or areas.
E. Grape Leaf Folder	1) Carbaryl 5% dust (Sevin)		20–25 lbs.	Sevin may cause a mite increase.
	2) Parathion* 2% dust		25–35 lbs.	Run the duster between every row to insure complete coverage. Be certain to direct the discharge of dust toward the tops of the vines.
	3) Methyl parathion* 2% dust		25–35 lbs.	
	4) **Bacillus thuringiensis** Thuricide 90 TS	1 qt.		Apply when first rolls appear.
	or Biotrol BTB 183-25 WP	2 lbs.		Apply at 200 gals. per acre.
	or Biotrol BTB 2.5 dust		20–40 lbs.	Apply at 200 gals. per acre.
F. Omnivorous Leaf Roller	1) Naled 4% (Dibrom) plus Carbaryl 5% (Sevin) dust		30 lbs.	To be applied before or immediately after worms enter bunches. Mite populations may increase following this combination.
	2) Carbaryl 50% WP (Sevin)	1 lb.		Apply at 200 gals. per acre.
	or Carbaryl 5% dust (Sevin)		25–30 lbs.	Treat when leaf rollers are on leaves and before they enter the bunches. Mites may increase following the use of Sevin.

	XIII JULY TO HARVEST		
Botrytis Rot (Slip Skin or Gray Mold)	Captan 15% plus Sulfur 25% dust	20 lbs.	Starting July 1 to July 15, apply 4 dusts at 3–4 week intervals. Apply to every row and direct toward the clusters. The first application should be made while the clusters are still loose. To prevent infections dusts must be applied before rains. If more than 3 weeks have elapsed since the last dusting, make an additional application when rain threatens. Dusting after rainfall has little effect on established infection, but helps protect against new infections should later rains occur.
	XIV HARVEST		
A. Drosophila (Vinegar or Pomace Fly)	1) Naled 4% dust (Dibrom)	25–35 lbs.	Do not use within 4 days of harvest.
	2) Malathion 4% dust	25–35 lbs.	Do not use within 3 days of harvest.
	3) Dusts containing 0.1% stabilizing pyrethrins or 0.08% stabilizing pyrethrins plus piperonyl butoxide.		Dust the delayed loads only once at the winery or dehydrator.
B. To protect the raisins against insect infestation during drying and storage on the farm.	Standard paper raisin drying trays treated with malathion (premium grade) at 100 mg/sq. ft. by paper manufacturer.		Malathion treated trays should be used in vineyards subject to insect infestation during drying. Since dead insects may accumulate on the trays, screening of the raisins prior to boxing is necessary. While the malathion treatment continues to offer protection from insects during farm storage, adequate covering is still necessary to safeguard against damage from rain and rodents.

* Use requires permit from Agricultural Commissioner.

Pest, disease or purpose	Material and formulation	Amount of material per 100 gals.	Amount of material per acre	Remarks
		XV. POSTHARVEST		
A. Variegated Grape Leafhopper (Coachella Valley)	1) Malathion 4% dust		15–20 lbs.	
	2) Carbaryl 5% dust (Sevin)		20–25 lbs.	
	3) Malathion 57% EC		1 qt.	Apply by ground equipment in 50 to 75 gals. of water per acre.
	4) Carbaryl 50% WP (Sevin)		2 lbs.	Apply as above.

B. Armillaria Root Rot (Oak-Root Fungus Disease)

Infected roots may remain deep in soils after trees or grapevines have been removed. It is therefore necessary that the fumigant penetrate deep in soils to obtain eradication of the fungus. Although increasing the dose tends to increase depth of penetration, it cannot be relied upon to be used to penetrate wet or soils high in clay. Complete eradication is rarely achieved and retreatment may be necessary in localized areas. If the soil is wet, or if it has extensive clay layers to the depths reached by the roots, it is doubtful that fumigant treatments will be successful.

Remove infected trees or vines, stumps, and large roots—ideally all those greater than 1½ in. in diameter. Dispose of them in areas where flood waters cannot wash them to agricultural lands. The fungus may survive on small dead roots. Therefore remove from the soil as many roots as possible and burn on the infected site before treating the soil. If infected roots are removed for burning elsewhere, some of the roots may be dropped and new sites of infection established. Warm, dry, well-worked soil is essential for effective treatment. Application is often made in September. Dry soil by withholding water during summer and using cover crops such as sudan grass or safflower. The drier the soil, the better for deep penetration. (This recommendation is specific for oak-root fungus control. For control of weeds, nematodes, and fungi which inhabit the surface layers of soils, moist soil is essential for successful fumigations.) Deep till the area after drying. Inject methyl bromide as deep as possible with chisels at the rate of 2 lb./100 sq. ft. and cover with a gas-proof cover. With clay soils, if dried, increasing the dose to 4 lb./100 sq. ft. aids in fumigating the deep layers. Remove the cover after 2 weeks, and aerate 1 month before planting.

Soil fumigation with carbon bisulfide prior to planting is moderately effective in controlling **Armillaria** root rot, although this fumigant is more difficult to apply. Complete eradication is not always achieved. Retreatment may be necessary in localized areas.

In making the carbon bisulfide application, sprinkle lightly to moisten the upper 3 inches of soil to confine the gas. Next, lay off area to be treated in 18-inch spacings on the diamond and open holes to a depth of 5–6 inches. Pour 2 fluid ounces of carbon bisulfide into each hole and close immediately by tamping with the heel. Special manually or

mechanically operated injectors can also be used for applying the chemical. Soil injection equipment should be adjusted to discharge no less than 302 gallons (weighing 3025 lbs. per acre) from chisels spaced 18 inches apart. One gallon of CS_2 will fumigate approximately 150 sq. ft. Two and three-fourths gallons are required to treat a space 20 × 20 feet. Growers should allow a minimum of 5½ drums (550 lbs. net) of CS_2 per acre. Remember, this chemical is very toxic and will kill plants. Do not plant in treated soil for 6 to 8 weeks after treatment. **CAUTION:** Carbon bisulfide is a heavy, volatile, highly explosive liquid. Do not permit smoking or any open flame in the area where it is being handled.

Recent studies on Armillaria root rot control in citrus have shown that methyl bromide will give satisfactory control of the fungus. However, methyl bromide has not been tested to control Armillaria in vineyard soils. Since carbon bisulfide is highly inflammable and may be ignited during applications to soils containing rocks, it is suggested that methyl bromide be used in vineyard soils. Follow recommendations of the manufacturer.

C. Root-knot, Root-lesion and Dagger Nematodes Pre-Plant Only a. Old orchard or vineyard land	1) DD	60–170 gals.	Use higher rates for heavy soils. Apply DD and Telone by chisel injection at 10–12 in. depth on 12 in. spacing. Seal soil soon after treatment with ring roller or drag. Meter Vapam into 6–8 acre inches of water in flood irrigation in basins (checks). Soil should be warm (50–85°F. at 6 in. depth), moist and cultivated thoroughly before application. Remove roots and other plant debris. Fall application usually is best because of warm soils. Pre-irrigation may be necessary to provide sufficient moisture. Do not plant until period of time equivalent to at least one week for each 10 gallons of DD or Telone. In heavy soils, and when soils are cold and/or wet after treatment, this period should be extended. When Vapam has been used, wait 14–21 days if soil is of a light to medium texture, well drained and warm; when soil is cold (below 60°F), wet, fine textured or high in organic matter, a waiting period of 30–60 days may be necessary.
	2) Telone	60–137.5 gals.	
	3) Vapam	50–75 gals.	
	4) Carbon bisulfide		
b. Land used for annual crops	1) DD or Telone	40–60 gals.	
	2) Vapam	50–75 gals.	

Pest, disease or purpose	Material and formulation	Amount of material		Remarks
		per 100 gals.	per acre	
				A two-year fallow period is suggested before treatment following removal of old vines or trees to allow decay of roots. A period of one to several months of fallow also may be necessary after removal of annuals, especially deep-rooted crops such as cotton.
c. Established vineyards	DBCP		2 gals. active	Apply to mineral soils in irrigation water flooded on the entire area including down the vine row. Use enough water to wet soil 4–6′. Treatment at fall post-harvest irrigation has best chance for improved growth the following season. Spring treatments may not give responses until the year after application.

U.S.D.A. Limitations on the Use of Chemicals Suggested in This Program

Chemical	Interval between last application and harvest	Tolerance in parts per million	Dosage in pounds actual material per acre
Captan	No time limitations	100	5.0
Carbon bisulfide	Preplant treatment	0	400–500
Chlordane	Do not apply to vines after blossoming	0.3	4.0
DBCP		25	34–86
DD	Preplant soil fumigation	0	320–480
DDT	40 days	7	5.0
Delnav (dioxathion)	30 days—one application after berries begin to form	2.1	1.0
Diazinon	10 days	0.75	1.0
Dibrom (naled)	4 days	0	1.0
Ethion		2	1.25
Gibberellins	Apply no later than two weeks after shatter stage	0.15	24 grams prebloom 12 grams bloom 48 grams postbloom
Guthion (azinphosmethyl)	No time limitations; not more than 3 times a season	5	0.75
Kelthane (dicofol)	7 days	5	1.2 spray 1.5 dust
Malathion	3 days	8	2.75
Methyl parathion	14 days	1	0.75
Parathion	14 days	1	1.5
	Apply only before fruit is the size of buckshot or after harvest		2.5
Phosdrin (mevinphos)	2 days	0.5	1.0
Pyrethrins piperonyl butoxide	Time of harvest pyrethrins—1 piperonyl butoxide—8		— —
Sevin (carbaryl)	No limitations	10	3.0
Sodium arsenite	Dormant application only	0	9.0
Standard lead arsenate	Not after fruit forms	7	15
Systox (demeton)	21 days	1.25	0.38
TDE (DDD)	40 days	7	5.0
Tedion (tetradifon)	Spray, not more than 3 applications during the fruit period; dust, not more than once after bloom	5	1.0 spray 1.5 dust
Telone	Preplant soil fumigation	0	320–480
TEPP	3 days	0	2.0 spray
Thiodan (endosulfan)	7 days	2	1.5
Trithion (carbophenothion)	30 days	0.8	0.5 spray 1.0 dust
Vapam	Preplant soil treatment	0	120–543

JANUARY, 1969

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Senator CRANSTON. Could you testify which of those are specified chlorinated hydrocarbons?

Mr. LEMMON. It shows product by product in the list here. It shows in the back, this is a publication of the California Agricultural Experiment Station and Extension Service, 1969 Pest and Disease Control Program for Grapes. The last page of which lists the various chemicals, the interval between the last application and harvest, under the USDA limitations, which they follow and the tolerance that is permitted, and the actual pounds per acre that is used, or maximum. The university recommendations are lesser amounts because under the particular conditions in California it is not necessary to use up the maximum.

Senator CRANSTON. What are examples of some of those that are classified as hydrocarbons?

Mr. LEMMON. You say which are or are not?

Senator CRANSTON. Are.

Mr. LEMMON. Kelthane is a chlorinated hydrocarbon; sulphur is not, it is the common dust that is used for mildew control. There are times when it is necessary to use dibrom, there are times when it is necessary to use malathion, which is a phosphate material.

Senator CRANSTON. When a field has been sprayed with a hard pesticide, how long do you require the field to remain posted?

Mr. LEMMON. With regard to those that are listed in the sub-class of injurious materials as restricted materials such as DDT, which requires a permit, there is no requirement for the posting. The requirement is that there be an interval of 30 days between application and harvest with regard to——

Senator MONDALE. Did you say you don't have to post for DDT?

Mr. LEMMON. You do not.

Senator MONDALE. How does the farm worker protect himself?

Mr. LEMMON. To begin with, DDT, as you will recall through the years, particularly beginning in the war years in Italy, was dusted on the population over there and it is commonly used without any injury from the standpoint of skin absorption.

Senator MONDALE. Are you testifying it is not harmful?

Mr. LEMMON. No, I am testifying it is not a problem for skin absorption. Oral intake is the problem on DDT. You move to a material such as parathion, then there is a problem of skin absorption where it is necessary to post in order that people will not come in contact with these until the product is——

Senator MONDALE. Is it your testimony that DDT, for which no posting is required in California laws, poses no occupational risks to the farmworkers in the field?

Mr. LEMMON. Yes.

Senator CRANSTON. Are you concerned only about skin absorption, or are you concerned about absorption in any other way?

Mr. LEMMON. There are three general ways for which a person can be poisoned: One is through oral intake, eating it; the other would be through inhalation, and the other would be through skin absorption. The purpose of our law is to protect people from each of those modes of poisoning and we base our regulations

upon expert advise from the doctors and the State Department of Public Health.

Senator CRANSTON. What actions do you take against the farmer who fails to post a required warning or who fails to keep the warning sign up as long as required?

Mr LEMMON. It would be a violation of the law and the usual thing would be to revoke his permit and not issue him another one if he used that type of material.

Senator CRANSTON. How often does that occur in California?

Mr. LEMMON. Probably rather seldom. I don't have figures in mind because there is compliance.

Senator CRANSTON. Is there a systematic checkup?

Mr. LEMMON. The agricultural commissioners and their inspectors do follow a pattern of checking to see that there is compliance with the law during this period.

Senator CRANSTON. Would you see any objection to a labor health and safety standard that would require that a field be certified as free of harmful pesticides before the field is safe for harvest labor?

Mr. LEMMON. I am not quite sure what type of certification.

Senator CRANSTON. I am just asking what you would think of adding a step that is not now required which would be in effect a health and labor safety standard which would require that a field be certified as free of harmful pesticides before the field is certified as safe for harvest labor.

Mr. LEMMON. I think for practical purposes the law now requires the farmer to warn his employees not to go into the field if it is in a hazardous condition.

You are asking, would I see any reason why he should not certify it and I can not see any difference.

Senator CRANSTON. It will be taking a positive rather than a negative attitude.

Mr. LEMMON. I think the bookkeeping involved would be difficult and expensive.

Senator CRANSTON. I don't understand that. What extensive bookkeeping would be required?

Mr. LEMMON. Well, if you were going to certify, I assume there would be a written certification. If there is a written certification then somebody has to keep records of those certifications and see that they are made.

Senator CRANSTON. Yes. I don't see any extensive bookkeeping required.

Mr. LEMMON. Well, there are thousands of different farms and fields in California, and it would depend upon who would be required to do the enforcing.

Senator CRANSTON. Thank you.

Senator MONDALE. Senator Murphy.

Senator MURPHY. No questions.

Senator MONDALE. Doctor, are you satisfied that the health of the farmworker in California is fully protected from exposure to the pesticides?

Mr. LEMMON. No.

Senator MONDALE. In what way would you change the law to provide that?

Mr. LEMMON. I don't think I would suggest changing the law. I would suggest that we continue with the educational program, carried on by Department of Public Health and others to get workers, and others that may be in the fields, to change their clothes every day and to bathe every day. I think that this is proper and the most important protective thing that can be done in order to protect workers.

Senator MONDALE. Would you require that the grower provide showers so that the farmworkers can wash off pesticides and change clothes?

Mr. LEMMON. It could either be the grower or whoever was handling the hiring and use involved. For example, I recommended to pest control operator firms that they insist that their employees handling the highly toxic phosphates bathe and not wear the same clothes home that they work in, and change every day. When this has occurred, the problems with regard to poisoning have disappeared.

Senator MONDALE. Now since it is the farmworker whose life and health is most at stake, would you recommend any changes in the law that empower him to find out what was in the field, or to have something to say about what kinds of poisons are used in the field? Are you satisfied with the present condition of the law?

Mr. LEMMON. I am satisfied with the law, but I would urge the farmworker if he has a concern about a particular field to enquire of the farmer as to what is in there. I think it is a very complex subject, though, and he does have to go to the agriculture commissioner if he has a concern.

Senator MONDALE. You believe the farmworker is fully protected now in obtaining the information he needs?

Mr. LEMMON. I think the law provides that he can get it.

Senator MONDALE. Do you think that in fact he is getting accurate information on all occasions to protect himself?

Mr. LEMMON. I think that he is not getting the information because he is not asking for it.

Senator MONDALE. Now is there not a lawsuit that has been under way for a year in which the farmworkers have tried to find out information from the agricultural commissioners on what kind of pesticides are being used by commercial applicators. Why did they bring that lawsuit if they are satisfied about the information?

Mr. LEMMON. The lawsuit in Kern County was instructing the Commissioner not to allow anyone to go through his files with regard to those reports filed by pest control operators, but I am saying that if the farmworker inquires of the farmer with regard to pesticides used on that farm, this farmer has a responsibility to tell him.

Senator MONDALE. I understand that, but if the farmworkers are satisfied that they can get all the information accurately by that method, why the lawsuit? In other words, apparently you are fully satisfied that there is no information problem at all to

the farmworker in protecting himself against pesticide residues, or spraying in the fields because he can simply ask. Is that right?

Mr. LEMMON. I am satisfied that the information is available.

Senator MONDALE. Is made available or is available?

Mr. LEMMON. Will be made available on request by the farmer.

Senator MONDALE. In your knowledge there is no problem in getting it or in the accuracy of it?

Mr. LEMMON. No.

Senator MURPHY. Would the Chairman yield for a question?

Senator MONDALE. Yes.

Senator MURPHY. Just to clarify this, I want to make sure the witness understands, and that I understand. You use the term "farmworker." Now one place it is my understanding that a farmworker can go and get the information.

Mr. LEMMON. Right.

Senator MURPHY. I believe the lawsuit was a request on the part of the United Farm Workers Organizing Committee. Now in this case they were denied the information, is that right? Is that what the law suit is about?

Mr. LEMMON. That is what the lawsuit is about.

Senator MURPHY. So you are talking now, to differentiate, between the individual farmworker when they get the information and a union may or may not represent the people on that farm, and who may or may not have any reason to be given access to the books. Is that the difference?

Mr. LEMMON. That is the difference.

Senator Murphy, Thank you very much.

Senator MONDALE. How soon after parathion has been applied in the field may workers safely enter the field?

Mr. LEMMON. It depends upon the amount of parathion that was applied and the type of crop upon which it was applied. Let me give you an example. In the case of artichokes on the Pacific Coast, San Mateo County, application at the rate they use for pest control in that area, can be sprayed 7 days before harvesting with no injury to the workers.

On the other hand, if there are several pounds per acre on citrus, it may take a month before it is safe to go in and work all day in the hot weather of the valley on the citrus trees.

The general rule is 14 days on the average on most crops if more than a pound per acre is applied.

Senator MONDALE. But it could be up to a month or more, depending?

Mr. LEMMON. Yes.

Senator MONDALE. No further questions.

Mr. LEMMON. Thank you.

Senator MONDALE. We will print your entire statement, together with attachments, at this point in the record.

(The material referred to follows:)

PREPARED STATEMENT OF ALLEN B. LEMMON, ASSISTANT DIRECTOR, CALIFORNIA DEPARTMENT OF AGRICULTURE, SACRAMENTO, CALIF.

My name is Allen B. Lemmon, and I am Assistant Director of the California Department of Agriculture. May I explain my background? I am a

graduate of Standford University with an A.B. in Engineering in 1930, and Degree of Engineer in 1932.

I have been employed continuously by the California Department of Agriculture since 1933. My first assignment was the inspection of fruits and vegetables for spray residues, and I have been interested in the protection of the public through enforcement of California pesticide laws ever since. During the period 1946 to 1956 I served as Chief of the Bureau of Chemistry of the California Department of Agriculture. In 1956 I became Chief of the Division of Plant Industry and have continued in this capacity. In 1968 I was designated Assistant Director of Agriculture covering Plant industry and other work as assigned by the Director.

On August 1, 1969, our Director of Agriculture, Mr. Jerry W. Fielder, sent you a description of our California pesticide regulatory program. With this was included an article authored by me and published in "Residue Reviews" (Volume 6, 1964) that fully describes the details of our complex, comprehensive pesticide regulator program.

On September 17, 1969, in response to a request from the Chairman of this Committee, Director Fielder sent you a letter responding to three questions that were asked. If there is any further response that I can provide you, Director Fielder has instructed me to do so.

(I request your consent to make these three documents a part of the hearing record.)

I would like to point out that our comprehensive pesticide regulatory program in California covers not only the licensing of the pesticides themselves but the licensing of the pest control operators with special examination for those serving as pilots to apply pesticides from aircraft. We have also classified 35 materials an injurious materials that require a permit before an individual may use the materials. These include materials such as parathion and DDT.

The reason that we are able to enforce this type of program is that in each county in California there is a county agricultural commissioner who has an extensive staff of county employees that are in the field at all times and know what goes on in the various agricultural production areas. These men are trained inspectors and are distinct from the Agricultural Extension Service. The agricultural commissioners, deputies, and inspectors are law enforcement officers enforcing the laws set forth in the Agricultural Code and the rules and regulations adopted by the Director of Agriculture under the authority of this Code.

A close, cooperative working relationship exists between the California Department of Agriculture and the California Department of Public Health. The Public Health Department's Bureau of Occupational Health and Epidemiology, under the direction of Dr. Thomas Milby, is conducting a study of the effect of pesticides on farm workers. Dr. Milby told me Friday that he had no results to report as the study was in the process of interviewing 2,000 persons. From the testimony Mr. Chavez gave yesterday, it is apparent the United Farm Workers Organizing Committee has talked with one of the many persons conducting interviews for Dr. Milby. I am sure this is why Mr. Chavez was unable to obtain any authoritative information.

Another example of Public Health's interest in cooperation is the information the Department has distributed to physicians in California on pesticides particularly organic phosphate diagnosis and treatment. Public health also has provided such material to any physician requesting it.

In addition to regulation of the sale and use of pesticides, the Department maintains laboratories where samples of fruits, vegetables, hay, meat, milk, and other raw agricultural commodities used for food purposes are analyzed. These samples are drawn from fields or lots in the course of being harvested or transported or in the wholesale markets or in retail outlets. This spray residuce inspection program is statewide and is for the purpose of assuring that the produce offered for sale to the consumer complies with the spray residue requirements set forth in the federal and state laws and regulations. Routine testing of produce enables us immediately to hold and require reconditioning of any produce that may be found with residue in excess of the permitted tolerance.

The samples of grapes that have been drawn in the routine process of our

work have not shown any grapes with spray residues in excess of the permitted tolerance. In no case have we found any aldrin on grapes. In response to a report on September 11, 1967, that signs were being displayed in front of a Purity Store in San Francisco alleging that the grapes for sale were poisoned, we drew four samples of the grapes on hand, analyzed them, and found that they did not carry any pesticide residue in excess of the tolerance. Only one sample carried any residue, and that was kelthane 0.6 parts per million, well within the legal tolerance of 5 ppm.

In California each agricultural pest control operator is required to submit a monthly report to the county agricultural commissioner in each county in which he does work showing the work that was done in that county. The records that are submitted to the agricultural commissioner enable him to determine if there have been misapplications and take proper action against a pest control operator or other person who was involved. I have personally contacted several of the agricultural commissioners including the Commissioner of Riverside County and the Commissioner of Kern County, and have been informed that their records do not show the use of any aldrin on table grapes in their counties. In checking with other counties, I have been informed that they have no records of the use aldrin upon grapes.

(For the record, I should like to submit statements by the agricultural commissioners of Riverside and Kern Counties attesting to the fact that aldrin is not used on grapes.)

California's pesticide laws and regulations have emphasized protection for persons, animals and crops. The 1969 Legislature has given the Department of Agriculture the added responsibility of protecting the environment. The law has been amended to require registrants of the pesticides classified as injurious materials to render quarterly reports of sales to the director. It also requires each agricultural commissioner to report to the director the type and amount of injurious materials for which permits are issued and the crop and pest or pests on which the material is used. The contents of these reports are required to be summarized quarterly by the director as to the type of material and amounts and such summaries are to be made a public record.

If there are any questions that I can answer, I will be pleased to have the opportunity to do so.

OFFICE OF AGRICULTURAL COMMISSIONER,
Riverside, Calif., September 23, 1969.

SENATOR GEORGE MURPHY,
Senate Office Building,
Washington, D.C.

Dear Sir: I am informed that recently testimony was presented to the Senate Sub-Committee on Migratory Labor to the effect that Thompson Seedless Grapes shipped from California were found contaminated with Aldrin at the rate of 18 parts per million (ppm).

Examination of the pesticide usage records on file in the Riverside County Agricultural Commissioner's Office indicates there has been no commerical application of the pesticide Aldrin on any table grape vineyards in the County of Riverside in 1969. In fact, a search of the records indicates that no Aldrin has been used for any agricultural purpose in the County of Riverside during the years 1968 and 1969.

Very truly yours,

ROBERT M. HOWIE,
Agricultural Commissioner.

STATEMENT OF SELDON MORLEY, AGRICULTURAL COMMISSIONER, COUNTY OF KERN, CALIF. AUGUST 7, 1969

Though May 30, 1969, there has been no commercial application of the pesticide aldrin on any table grape vineyards in the County of Kern this year.

The only commercial application of aldrin in the County of Kern in 1969 has been as follows:

January 1969—104 acres of lettuce.

February 1969—81 acres of sugar beets.
March 1969—127 acres of tomatoes.
April 1969—46 acres of tomatoes.
There have been no further commercial applications of aldrin in the County of Kern this year.
Aldrin must be registered with the State Department of Agriculture and all commercial applications of aldrin and other pesticides to agricultural crops are required by law to be reported to the Agricultural Commissioner in the county where applied.

Senator MONDALE. Our next witness is Mr. Anthony Bianco.

STATEMENT OF ANTHONY A. BIANCO, JR., PRESIDENT, BIANCO FRUIT CORPORATION, FRESNO, CALIF.

Mr. BIANCO. My name is Anthony A. Bianco, Jr., a resident of Fresno, Calif., and president of the Bianco Fruit Corp., growers and shippers of table grapes in the Coachella Valley, Arvin, Delano, and Fresno areas of California. As such, I am engaged in business in the four largest table grape-growing regions of the State.

I am also one of the 12 California table grape growers who agreed to negotiate—and tried to negotiate—with the United Farm Workers Organizing Committee in late June and early July of this year in an effort to achieve a labor contract covering my grape pickers. Those negotiations continued for 3 weeks and recessed, without a successful conclusion.

May I add I don't even have a certified labor dispute.

But more important to these hearings, I am the grower of the Thompson seedless grapes which were presented to this subcommittee on August 1 as containing harmful levels of the pesticide aldrin. Specifically, the report on my grapes by the C. W. England Laboratories said the aldrin content was 18 parts per million aldrin, or 180 times the established human tolerance level.

The England report says UFWOC advised the laboratory the grapes in question came from my operation in the Coachella Valley. This subcommittee was told the Thompson seedless grapes were purchased from a Safeway store in Washington.

I did not ship any Thompson seedless grapes from the Coachella Valley to Washington. I did ship a carload of Thompson seedless grapes to a distributor in Baltimore on July 12, the second-to-last shipment from my Coachella vineyards. The final Coachella shipment went to Texas the following day.

The owner of that company advised that the carload he received arrived in Baltimore on July 19 and that none of the grapes were sold to Safeway stores. Fifty boxes—the only grapes which could have reached Washington—were sold to the National Produce Co. The remainder of the shipment was broken into small lots for sale to other chains. But Safeway Stores, whose retail outlets in the Washington area were closed by a labor dispute at that time, did not purchase any.

My first direct shipment of Thompson seedless to Washington this year was made July 25 from the Arvin area of Kern County.

The first consignment went by rail and took 8 days to arrive, so the grapes could not have been on store shelves for UFWOC to purchase on July 30. A truckload of Thompson seedless left Arvin July 26 for Washington and arrived 5 days later—or July 30. These must have been the grapes that UFWOC submitted to the England Laboratories.

Senator MONDALE. Would you yield there.

Are you seeking to establish that the grapes which the farmworkers, and later Safeway, submitted to England Laboratories and Eastawai were not grapes from your farm?

MR. BIANCO. No.

Senator MONDALE. Proceed.

Mr. BIANCO. But these grapes weren't in the same condition as when they left my vineyards. The reason—I don't use aldrin on grapes. No grower in the Coachella Valley or Kern County—and that includes Delano and Arvin—uses aldrin on grapes. I don't know of any grape grower anywhere who uses aldrin on grapes.

A sworn statement to the effect that I have not used aldrin has been placed into the Congressional Record, along with statements from my pesticide supplier and applicator. Copies of these statements are attached and I ask that they be made a part of the record at this point.

Senator MONDALE. Without objection, so ordered. For purposes of the printed record, we will print your entire statement, together with the attachments, at the close of your remarks this morning.

Mr. BIANCO. When I made that statement, I checked my records for the previous 6 years. Since then, I have examined the balance of my records and I am sure I have never used aldrin on any crop.

The agricultural commissioners in the counties where I grow grapes have stated no aldrin is used in any vineyard in their counties. County agricultural commissioners in California must be advised of any commercial application of pesticides in their counties. The University of California, which advises farmers on pesticides, does not include aldrin in their 1969 pest control recommendation as a pesticide useful to grape production.

The Food and Drug Administration survey on its 60 tests in market and packer samplings across the country found no trace of aldrin on any grapes, including mine, which were specifically tested by the FDA.

I resent the tactic that has been used against me.

This aldrin scare is no more than another effort to whip me into submission.

Senator MONDALE. Would you yield there.

Mr. BIANCO. Yes.

Senator MONDALE. Would you say Safeway also uses aldrin as part of that effort to whip you into submission?

Mr. BIANCO. No.

I tried to negotiate but could get nowhere in the face of UFWOC's nonnegotiable demands. Now UFWOC is trying to bring me down in retaliation.

What has happened here is contrary to the stated principles of Cesar Chavez and his movement. Trace his movement. He failed to persuade workers on farms to join his organization. He staged a boycott aimed at forcing union organization by pressuring stores. Now he has moved to this new tactic of trying to destroy an industry with the false charge of pesticide contamination.

I find it difficult to believe that UFWOC now makes its stand on pesticides in the name of worker and consumer health. Mr. Chavez testified yesterday that the negotiations broke down over the issues of wages and pesticides.

The facts are that the negotiations failed over a number of issues. And, significantly, it was pesticides on which UFWOC was most ready to give. UFWOC used pesticides as a throwaway item in the negotiation.

Mr. Chavez' committee made an offer in writing through the Federal Mediation and Conciliation Service. I should like to read that proposal.

That we are prepared to give a moratorium to the whole industry on the pesticide campaign for a limited time in exchange for an acceptable contract covering all workers, all crops.

That isn't the kind of offer a man who claims to be sincere about pesticides would make.

Senator MONDALE. Would you yield there?

Mr. BIANCO. Yes.

Senator MONDALE. When Mr. Chavez testified, I think he indicated that he had wired the growers indicating that he was willing to yield some on the wage issue if you were willing to accept more effective controls, as the wine grape growers have, in contracts on pesticides. Did you receive that wire?

Mr. BIANCO. No, I did not.

Senator MONDALE. Proceed.

Mr. BIANCO. While this pesticide campaign has been going on, there have been firebombings of cars belonging to grape pickers working in the fields and of growers' packing sheds. Since the boycott began, incendiary fires in rural areas of California have increased drastically, particularly in the grape-growing regions.

We who tried to negotiate with the Chavez people have been a major target for harassment. On September 12, for example, I was investigating a mysterious $6,000 fire in one of my packing sheds when a firebomb was thrown at another shed and some lug boxes were burned in a Delano field.

The campaign has taken another approach of late. The California Rural Legal Assistance, an organization financed with Federal funds and whose board of directors includes Cesar Chavez, has filed a number of nuisance suits against grape growers. One was filed against me, which my attorneys say is only further harassment.

This UFWOC pesticide campaign is false. We in the table

grape industry observe all regulations set forth by competent authorities and regulatory agencies in pesticide application and control. We do not take chances in the fields, either with our workers' safety or our own.

I would point out that this suit I am wearing today is not my work uniform, and I did not get this suntan playing golf.

I have no intention of committing suicide in my own fields.

Senator MONDALE. Mr. Bianco, are you satisfied that in the fields of Southern California where the grape workers toil, that they are fully protected from any pesticide poisoning which might affect their health or their life?

Mr. BIANCO. Yes.

Senator MONDALE. There is no problem whatsoever?

Mr. BIANCO. No.

Senator MONDALE. Then how do you feel about the survey conducted by Dr. Mizrahi which said that of the workers surveyed, 80 percent had symptoms of pesticide injuries? Or the work of Dr. Irma West, who is with the State of California, which said that occupational disease in agriculture is a number one problem and three times higher than the average of all industries, and that 3,000 children are treated for ingestion of pesticides every year?

In addition to that, of course, HEW, and they included California in their survey estimates, testified that perhaps as many as 800 people die a year from pesticides, and that possibly as many as 80,000 are injured.

Do you think it is fair to say then that this exposure to pesticides problem raised by the farmworkers is a scare tactic?

Mr. BIANCO. Well, in those statistics I would like to know, are they grape workers? Are they working in the vineyards, or what type of work were they doing?

Senator MONDALE. The one survey was grape workers. The HEW survey was farmworkers generally exposed to pesticides, including grape workers. Dr. West, I assume, would not conduct a survey of occupational diseases in California without including the grape industry.

You heard Mr. Chavez' specific examples yesterday, which went about six pages, naming specifics and symptoms. Is it your testimony that this is all trumped up?

Mr. BIANCO. Well, as far as our particular vineyards are concerned, our workers have never complained of any illness while working in our vineyards.

Senator MONDALE. Are you willing to limit your observations to your farm, or do you still want to say the farmworkers are trumping up a charge in terms of occupational hazards?

Mr. BIANCO. Well, I have not heard of any other farmers complaining of their workers being taken ill on account of working on the farms.

Senator MONDALE. Based on that, are you willing to testify that it is a trumped-up charge, and that the farmworker's health is not risked by pesticides?

Mr. Bianco. No.

Senator Mondale. Now suppose you were just a neutral citizen, living in Washington, D.C. You liked grapes, and you were not interested in this boycott at all. But, in the health of your children, and you were wealthy enough to decide that you wanted to test grapes for pesticide residues. What reasonable step would you take to test the grapes?

Mr. Bianco. To do what? I didn't get that.

Senator Mondale. You just wanted to find out if grapes in Washington, D.C., have pesticides on them to determine whether you want your family to eat them. What would you do? What would be a fair thing to do?

Mr. Bianco. I would wash the grapes and eat them. I have a lot of faith in our Government agencies that if there was anything wrong with the products, I am sure it would not be for sale.

Senator Mondale. Suppose you took this step. Suppose you went down to the Safeway and you bought a bunch of grapes and you took it to England Laboratories, and England Laboratories came up and said they had 18 p.p.m. residue of aldrin, and you were disturbed, so you wrote a letter to the editor setting forth what the test showed. Do you think that would be false and irresponsible on the part of the citizen?

Mr. Bianco. No, I would not, but why would I take a bunch of grapes from a store to a laboratory?

Senator Mondale. Suppose you were the president of Safeway, and you were concerned, and you decided you wanted to know whether there was aldrin on those grapes or not. So you took three tests—four of them, one of them to Eastawai and another to Strasburger, and you determined that in your opinion these were good laboratories. Your major concern as a store president, is protection of your customers, which is very important. You have routinely over the years used these same laboratories to determine whether or not the consumers are protected, and you took those tests, and three out of four came back with findings of aldrin, and you were concerned. Would you think that was irresponsible on the part of Safeway?

Mr. Bianco. No.

Senator Mondale. Now what did the farmworkers do that was different in their test?

Mr. Bianco. Why did they take the grapes to the laboratory?

Senator Mondale. Well, I am not asking you to be a psychiatrist, I am asking you what did they do that was different.

Mr. Bianco. Nothing.

Senator Mondale. Do you think that your statement in your handout yesterday that this is a false pesticide scare is a fair characterization of what they did?

Mr. Bianco. Well, we were warned about this. Either we complied with their contract or they would use this pesticide.

Senator Mondale. Would you have any reason to believe that

they were dealing falsely when they took a sample to England Laboratories, and got their results?

Mr. Bianco. I would not know.

Senator Mondale. Do you think it was irresponsible on their part to take grapes and have them tested at an independent laboratory saying that was the same that Safeway uses?

Mr. Bianco. No.

Senator Mondale. Is it possible that what exists here is an honest difference of opinion, and not a false and irresponsible effort?

Mr. Bianco. It is possible.

Senator Mondale. Any other questions?

Senator Murphy. Yes.

Now to go back on this, actually the Chairman asked what the farmworkers did that was different. As I understand it from listening to the testimony and reading, the farmworkers did go and buy grapes. One sent a sample and they took that sample to the England Laboratories. Please correct me if I am in error. The England Laboratories found an extraordinarily dangerous amount of a pesticide called aldrin on the grapes and then they publicized this and made it a basis of a campaign to be used to further discourage the purchase of California grapes. So they did do something that was different and unique and particular, and certainly to be used in their interest in their desire to organize the grape industry. So they did actually do something different, I would think.

Senator Mondale. Well, they testified——

Senator Murphy. Just to continue, subsequent to that when the interest was drawn, the Chairman, thank goodness, called the FDA and the FDA came in and did an examination and found that there were possibly traces of aldrin but not the extraordinary amount that was found on the first samples.

Now this aroused curiosity and we find now that the grower of the grapes—the alleged grower of the grapes—in his testimony here yesterday showing the sign taken from the frap; the grower of the grapes testifies today that he has not used aldrin on the grapes which brings me back to my starting point: Who put the overalls in Mrs. Murphy's chowder? Who put the aldrin on the grapes, how did it get there?

Senator Mondale. The plot really thickens. Then the Safeway sells their own grapes with aldrin. It really thickens the plot.

Senator Murphy. That is the Chairman's statement, not mine.

Senator Mondale. Oh, you are being very selective.

Senator Murphy. Yes; I am. I am just as mysteriously concerned as to how that aldrin in the Safeway test got on these grapes, which came from the same vineyard, and there was no aldrin put on the grapes, no evidence has been used, no sworn testimony that has not been used. How did the aldrin get on any of the grapes? This I don't understand.

Senator Cranston. What pesticides do you use on the grapes you grow?

Mr. BIANCO. Use Kelthane 7 dust.

Senator CRANSTON. Is that it?

Mr. BIANCO. Yes.

Senator CRANSTON. Is that less dangerous than chlorinated hydrocarbons?

Mr. BIANCO. Kelthane is.

Senator CRANSTON. Thank you.

Senator MONDALE. One final question: In addition to being a grower you are also a shipper, are you not?

Mr. BIANCO. Yes; I am a grower and shipper.

Senator MONDALE. Do you occasionally handle grapes as a shipper not grown on your farms?

Mr. BIANCO. Yes.

Senator MONDALE. Thank you.

Senator MURPHY. May I ask a question, Senator Mondale?

Just to conclude what I assume to be the logic of the Chairman's question, in other grapes that you have shipped do you think there is any possibility of aldrin having been used on those grapes?

Mr. BIANCO. That is impossible.

Senator MURPHY. So, in other words, neither the grapes which you grew nor the grapes which you shipped contained, or had been sprayed with aldrin?

Mr. BIANCO. They were not.

Senator MURPHY. Thank you very much.

Senator MONDALE. Thank you. We will print your full statement, together with the attachments, at this point in the record.

(The prepared statement of Mr. Bianco follows:)

STATEMENT OF ANTHONY A. BIANCO, JR.
Fresno, California
President, Bianco Fruit Company

Before the Senate Subcommittee on Migratory Labor
Washington, D. C.
September 30, 1969

* * * * * * * *

My name is Anthony A. Bianco, Jr., a resident of Fresno, California, and president of the Bianco Fruit Corporation, growers and shippers of table grapes in the Coachella Valley, Arvin, Delano and Fresno areas of California. As such, I am engaged in business in the four largest table grape-growing regions of the state.

I am also one of 12 California table grape growers who agreed to negotiate--and tried to negotiate--with the United Farm Workers Organizing Committee in late June and early July of this year in an effort to achieve a labor contract covering my grape pickers. Those negotiations continued for three weeks and recessed, without a successful conclusion, on July 3.

But more important to these hearings, I am the grower of the Thompson seedless grapes which were presented to this Subcommittee on August 1 as containing harmful levels of the pesticide aldrin. Specifically, the report on my grapes by the C. W. England Laboratories said the aldrin content was 18 parts per million aldrin, or 180 times the established human tolerance level.

The England report says UFWOC advised the laboratory the grapes in question came from my operation in the Coachella Valley. This subcommittee was told the Thompson seedless grapes were purchased from a Safeway Store in Washington.

I did not ship any Thompson seedless grapes from the Coachella Valley to Washington. I did ship a carload of Thompson seedless grapes to a distributor in Baltimore on July 12, the second-to-last shipment from my Coachella vineyards. The final Coachella shipment went to Texas the following day, July 13.

The owner of that company advised that the carload he received arrived in Baltimore on July 19 and that none of the grapes was sold to Safeway Stores. Fifty boxes--the only grapes which could have reached Washington--were sold to the National Produce Company. The remainder of the shipment was broken into small lots for sale to other chains. But Safeway Stores, whose retail outlets in the Washington area were closed by a labor dispute at that time, did not purchase any.

My first direct shipment of Thompson seedless to Washington this year was made July 25 from the Arvin area of Kern County. The first consignment went by rail and took eight days to arrive, so the grapes could not have been on store shelves for UFWOC to purchase on July 30. A truckload of Thompson seedless left Arvin July 26 for Washington and arrived five days later--or July 30. These must have been the grapes that UFWOC submitted to the England Laboratories.

But these grapes weren't in the same condition as when they left my vineyards. The reason--I don't use aldrin on grapes. No grower in the Coachella Valley or Kern County--and that includes Delano and Arvin--uses aldrin on grapes. I don't know of any grape grower anywhere who uses aldrin on grapes.

A sworn statement to the effect that I have not used aldrin has been placed into the Congressional Record, along with statements from my pesticide supplier and applicator. Copies of these statements are attached and I ask that they be made a part of the record at this point. When I made that statement, I checked my records for the previous six years. Since then, I have examined the balance of my records and I am sure I have never used aldrin on any crop.

The agricultural commissioners in the counties where I grow grapes have stated no aldrin is used in any vineyard in their counties. County agricultural commissioners in California must be advised of any commercial application of pesticides in their counties. The University of California, which advises farmers on pesticides, does not include aldrin in their 1969 Pest Control Recommendation as a pesticide useful to grape production.

The Food and Drug Administration survey on its 60 tests in market and packer samplings across the country found no trace of aldrin on any grapes, including mine which were specifically tested by the FDA.

I resent the tactic that has been used against me.

This aldrin scare is no more than another effort to whip me into submission. I tried to negotiate but could get nowhere in the face of UFWOC's non-negotiable demands. Now UFWOC is trying to bring me down in retaliation.

What has happened here is contrary to the stated principles of Cesar Chavez and his movement. Trace his movement. He failed to persuade workers on farms to join his organization. He staged a boycott aimed at forcing union organization by pressuring stores. Now he has moved to this new tactic of trying to destroy an industry with the false charge of pesticide contamination.

I find it difficult to believe that UFWOC now makes its stand on pesticides in the name of worker and consumer health. Mr. Chavez testified yesterday that the negotiations broke down over the issues of wages and pesticides.

The facts are that the negotiations failed over a number of issues. And, significantly, it was pesticides on which UFWOC was most ready to give. UFWOC used pesticides as a throw-away item in the negotiations.

Mr. Chavez' committee made an offer in writing through the Federal Mediation and Conciliation Service. I should like to read that proposal.

"That we are prepared to give a moratorium to the whole industry on the pesticide campaign for a limited time in exchange for an acceptable contract covering all workers, all crops."

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We who tried to negotiate with the Chavez people have been a major target for harassment. On September 12, for example, I was investigating a mysterious $6,000 fire in one of my packing sheds when a firebomb was thrown at another shed and some lug boxes were burned in a Delano field.

The campaign has taken another approach of late. The California Rural Legal Assistance, an organization financed with federal funds and whose board of directors includes Cesar Chavez, has filed a number of nuisance suits against grape growers. One was filed against me, which my attorneys say is only further harassment.

This UFWOC pesticide campaign is false. We in the table grape industry observe all regulations set forth by competent authorities and regulatory agencies in pesticide application and control. We do not take chances in the fields, either with our workers' safety or our own.

I would point out that this suit I am wearing today is not my work uniform and I did not get this suntan playing golf.

I have no intention of committing suicide in my own fields.

# # #

COPY

Statement of Anthony A. Bianco, Jr.

This will certify that I, Anthony A. Bianco, Jr., owner and operator of the Bianco Fruit Corporation, have not purchased, obtained or received the chlorinated hydrocarbide Aldrin and have not applied, administered or used Aldrin in any of my fields during the past six years. Aldrin has not been authorized for use on my property in any form or method during that period. The Griffin Spray Company has applied all pesticides for the Bianco Fruit Corporation during the past six years and has made no application or other use of the chemical Aldrin on my property in that period.

(signed)

Anthony A. Bianco, Jr.

Bianco Fruit Corporation
Delano-Arvin-Thermal

STATE OF CALIFORNIA)
COUNTY OF KEARN) 55

On August 8, 1969, before me, the undersigned, a Notary Public in and for said County and State, personally appeared Anthony A. Bianco Jr. known to me to be the President of the Corporation that executed the within instrument, known to me to be the person who executed the within instrument on behalf of the Corporation therein named, and acknowledged to me that such Corporation executed the within instrument pursuant to its bylaws or a resolution of its Board of Directors.

WITNESS my hand and official seal.

(SIGNED)
Notary Public

(OFFICIAL SEAL)

Joyce M. McPherson
my commission expires Mar.10,1970

COPY

SOVAL SOUTHERN VALLEY CHEMICAL CO.
PHONES
BAKERSFIELD 366-3900
ARVIN 774-3379
P. O. BOX 181 · ARVIN, CALIFORNIA

August 6, 1969

To Whom It May Concern:

This is to certify that Bianco Fruit Corporation has not purchased or applied, to our knowledge, any Aldrin during the past six years. Tom Griffin is an owner of Southern Valley Chemical and is the owner of Griffin Spray Company. Griffin Spray Company has handled the application of pesticides for Bianco Fruit Corporation for the past six years and has made no application of the chemical Aldrin.

(signed)
Ed Sampson
Manager & Co-Owner
Southern Valley Chemical Co.

ES/lj

Senator MONDALE. Our final witness this morning is Mr. John Giumarra.

STATEMENT OF JOHN G. GIUMARRA, JR., GENERAL COUNSEL, GIUMARRA VINEYARDS CORP., EDISON, CALIF.

Mr. GIUMARRA. I am John G. Giumarra, Jr., a resident of Bakersfield, Calif., and general counsel of Giumarra Vineyards Corp. We are grape growers in the Arvin and Delano regions of Kern County and are one of the many targets of the United Farm Workers Organizing Committee boycott effort.

Despite that boycott effort and intensive efforts by UFWOC to organize our workers and other farmworkers in California and across the Nation, our crops—and the total crop of the table grape industry—have been harvested and marketed in each of the past 4 years.

Our 1969 crop is similarly flowing to market right now as Mr. Cesar Chavez and UFWOC trumpet their strike and boycott calls before this committee and in the marketplaces of the Nation.

This crop is moving because UFWOC has failed in each and every phase of its campaign and is now resorting to cynical and desperate tactics to keep its cause alive.

UFWOC has failed in the fields where it has been unable to win over the workers and unable to halt the production or harvest of table grapes.

UFWOC has failed with the boycott because the consumers of America want grapes and will eat them if they are for sale. UFWOC has further failed in the marketplace because the stores of America have stood up under the worst kind of coercion, refusing to serve as arbiters in a dispute which is not of their making and refusing to deny freedom of choice to the consumer.

Now, as this hearing has established beyond doubt, Mr. Chavez and UFWOC, in a last ditch effort to buoy up their cause, have recklessly leveled the false charge that the grape growers are poisoning the American people. Mr. Chavez has come to Washington to testify before the highest legislative body in the land in an attempt to use this revered place as the staging ground for an effort which could well destroy the table grape industry and the livelihood of the farmworkers for whom he professes such deep concern.

That tactic has failed because of the diligence this subcommittee has shown in pursuing the truth. His defamatory charge against this industry is based on the flimsiest possible evidence—Mr. Chavez' single laboratory analysis of one 4-pound sample from nearly a billion—and I emphasize that—pounds of California table grapes. And indeed even this test was demonstrated to be inaccurate.

Let us look at that evidence.

Dr. Paul E. Porter, a world-renowned chemist and unimpeachable expert in pesticides, has refuted beyond question the charge that California table grapes are contaminated by aldrin. His scientific expertise, brought down to language everyone can understand

proves that the test cited to this committee on August 1 was either in error, or that the grapes were deliberately doctored by someone.

Senator MONDALE. Would you yield there.

Mr. GIUMARRA. Certainly.

Senator MONDALE. Did he say those tests were deliberately doctored?

Mr. GIUMARRA. He cited the fact that the only way that 18 parts per million could have shown up would either have been an artifact or that they were deliberately doctored by someone. I think he used the word "spiked." If you will check the record in his responses to your question, he indicated that really the only two ways would be either faulty analysis or "spiked." If Dr. Porter is still here, you may ask him. It is in the record, Mr. Chairman, if you would like to play it back after I am finished.

Senator MONDALE. Do you think there is any evidence that the farmworkers got to that sample?

Mr. GIUMARRA. I am reporting what Dr. Porter reported here.

Senator MONDALE. But you are sponsoring that, are you not? You are saying there is some basis to believe this was doctored?

Mr. GIUMARRA. I am not sponsoring Dr. Porter. Dr. Porter was here to testify by invitation. What I am saying, Mr. Chairman, is this: That to get 18 parts per million of the chemical aldrin on a California table grape is a highly unusual circumstance, and either there has to be a failure in the testing analysis, as indicated by Dr. Porter, or something was done to the grapes. He indicated, as an example, that something could have happened in transit. He used the word "spiked," though.

Senator MONDALE. Let me repeat my question: Do you want to conclude your testimony here by leaving the charge that the farmworkers deliberately doctored that sample? Do you want to stand behind that? Is there any evidence that that has been doctored?

Mr. GIUMARRA. I said "or" that the grapes were deliberately doctored by someone and I did not charge that the United Farm Workers Organizing Committee did it, specifically. I don't know whether they were doctored or whether the test was inaccurate.

Senator MONDALE. The samples that were submitted by the Safeway, were they deliberately doctored?

Mr. GIUMARRA. I would say that the Safeway samples manifest the same type of inaccurate processes that Dr. Porter testified to here this morning and that the FDA testified to here yesterday morning. If I were the president of of Safeway, as you indicated before, and I were apprised of the fact that there might be some deleterious residue on my table grapes, I of course would make an analysis of that with a reputable independent laboratory. But by making a charge, as the union has done here, before a Senate subcommittee of the United States of America, indicating that the American consumer is possibly being poisoned, and then citing as evidence the one bad test in 100 years of table grape production, when there has never been any evidence in the history of this country presented by the Food and Drug Administration or any State agency—and

I might add that state agencies, too, constantly check throughout the United States—that there was any deleterious chemicals on grapes, I would indicate that UFWOC has made a reckless charge, and I would indicate that you have to put Safeway's tests in the context of the things I am going to get in my testimony.

Senator MONDALE. You said you are willing to stand behind your statement that the farmworkers may have deliberately doctored their samples.

Mr. GIUMARRA. Please don't, you are putting words in my mouth.

Senator MONDALE. Well, that is your statement, too.

Mr. GIUMARRA. I said here "or that the grapes were deliberately doctored by someone." You are saying the farmworkers. If you would like to conclude that, you heard the evidence. I indicated by "someone".

Senator MONDALE. When you make a statement like this who do you suppose the average American is going to assume you mean by "someone?"

Mr. GIUMARRA. Well, I will let my statement and the evidence presented here speak for itself, Mr. Chairman, because of the fact that there are only two ways that that grape sample could have had 18 parts per million of aldrin.

Senator MONDALE. All right. Would you say, then, that we say the same of the Safeway samples, that it could have been deliberately doctored by somebody? Would you be willing to say that about both Safeway and the farmers?

Mr. GIUMARRA. Since the grapes came from the same warehouse, Mr. Chairman, I suggest that that is a possibility.

Senator MONDALE. In both cases?

Mr. GIUMARRA. That is a possibility. They came from the same warehouse.

Senator MONDALE. I submit that is some sort of a record. Some of them came from the railroad cars, some came from the warehouse, some came from the stores.

Senator CRANSTON. May I ask a question.

Are you suggesting that not only the small samples may have been spiked by someone, but that a whole vast supply in the warehouse that was going out across the country may have been spiked?

Mr. GIUMARRA. Well, it was not going out across the country, Senator Cranston, it was really only going to a limited area here around the District of Columbia.

Senator CRANSTON. Is it your suggestion that possibly the grapes picked up were not spiked in transit during examination, but that a supply going from a warehouse out to the general public in the Washington area may have been spiked at the warehouse?

Mr. GIUMARRA. I suppose that that is a possibility. What I am really suggesting is that on page 25 of the original transcript of testimony presented to this subcommittee there was a question by Senator Bellmon to Mr. Cohen concerning DDT. Senator Bellmon said, "Do you remember what levels of DDT contamination there were?" Mr. Cohen had been talking about DDT and Mr. Cohen out of the blue said, which was not responsive, "We just got a report today from

Washington that talks about 18 parts per million for aldrin. That was on Bianco grapes. Some of the grapes were two and three parts per million. It is under seven parts per million, but the problem is that they are using DDT." And he goes on about other things.

The statement was made by Mr. Cohen that there were 18 parts per million. If I may show you——

Senator MONDALE. That was a test, was it not? In other words, they submitted a test from England Laboratories.

Mr. GIUMARRA. And I am trying to explain the reason for the results of the test, because that is the reason for this subcommittee hearing, sir. This is why I was invited here, to explain why 18 parts per million were on that grape. I don't think there is any need to be supersolicitous as to who in fact is responsible for it. It may well have been, as Dr. Porter suggested in his testimony, that indeed the testing was faulty, and that is what the FDA indicated.

Senator MONDALE. Four independent laboratories found aldrin and one expert that is in the business, the company that sells aldrin.

Mr. GIUMARRA. No, we only have two independent laboratories that found aldrin, the third laboratory did not find aldrin. The FDA took 60 tests around the United States and did not find any.

Senator MONDALE. Four separate tests.

Mr. GIUMARRA. Four separate tests, but one laboratory made three of the tests. That is not very persuasive.

Senator CRANSTON. You are making a more serious charge than I understood originally, because you are suggesting that perhaps this was not just a few pounds of grapes en route to the laboratory that were spiked, but some unknown and large quantity of grapes going from a warehouse out to where the general public would buy them were spiked.

So you are suggesting what amounts to poison on goods that were headed for the public.

Senator MURPHY. Would the Senator yield for a question?

Mr. GIUMARRA. I am not suggesting that, Senator Mondale is the one who said that.

Senator MURPHY. May I intersperse a question. Was the Senator's meaning that by some strange quirk of circumstances that the bunch of grapes that was taken first to England was the only bunch of grapes in that condition, that this was just not taken from among the whole group of grapes?

Senator CRANSTON. I am trying to understand what he is suggesting—and I wish he would clarify this. I gathered from what you said, Mr. Giumarra, that it may not have been just the grapes that were en route from Safeway to a laboratory in two instances that might have been spiked, but since you have referred to the fact that they came from a common warehouse, that the spiking might have occurred back at the warehouse headed for the general public in the Washington area. Is that a correct understanding?

Mr. GIUMARRA. If in one sentence I could summarize all the evidence, I would suggest to you that this testimony represents that, from a scientific standpoint, which is about the only way we can really conclude anything, as to how, from a scientific standpoint, we

ended up with 18 parts per million of aldrin on a California grape in Washington, D.C. You would either have to have faulty testing or someone would have had to have doctored the grapes.

Now I am suggesting that the evidence presented here yesterday and today indicates that the testing by the two laboratories which found aldrin was faulty, but from a scientific standpoint, I have to raise the other possibility because we should also take it into consideration.

Senator MONDALE. If you would leave it there, that there is an unresolved conflict among laboratories, I don't think anyone would disagree with you. But your testimony is laden with charges of fraud, of deliberate doctoring, and misuse, by a union that took grapes to an independent laboratory and found aldrin, and it is that charge for which you have no information.

Mr. GIUMARRA. I disagree with that, Senator. The statement about the deceits and falsehoods I think relate to the overall issue of UFWOC's raising one test out of literally thousands and thousands of tests that have been taken, raising this issue when I am sure—and I think that if we had to support this by affidavit I could do so—that Mr. Cohen, who made the aldrin charge here, knew that aldrin is not even used on table grapes in California. He knew this because the commissioner of Kern County publishes an annual pesticide report—which he offered to show to Mr. Cohen, and whether Mr. Cohen took a look at it or not, I do not know—showing all of the chemicals that are applied on California table grapes.

I am suggesting that it is deceitful and a misrepresentation to present one test to this subcommittee when the FDA, in the entire history of this country and the entire history of the FDA, has never found any deleterious residue of aldrin on California grapes.

Senator MONDALE. Is it your testimony that the England Labs prepared a deceitful test, and that the farmworkers who took this bunch of grapes for testing knew that they had in possession a deceitful report? What is your testimony?

Mr. GUIMARRA. I don't think I could state it any clearer than I just did, Senator. I stated that—well, it is in the record. I just stated that to submit one test out of all the thousands of tests that have preceded it, to disclose this test at a hearing, and make the charge that consumers are being poisoned, and use that test, in conjunction with an exhibit which I am going to enter into the record in a moment, to scare the American public into believing that there are illegal pesticides in excessive tolerances on grapes, is an irresponsible and deceitful act. Now this is something different than we were just talking about.

Senator MONDALE. Would you say that even though Safeway later tried three separate laboratories and two of the three also came up with aldrin, that those laboratories and their tests are deceitful? There just is not enough for a responsible and honest person to believe there is an issue? Is that your testimony?

Mr. GIUMARRA. I believe there is not enough UFWOC evidence for an honest person to think there is really an issue here, that is right.

Senator MONDALE. Did Safeway in fact suspend some of their purchases with Bianco on the basis of those surveys?

Mr. GIUMARRA. Safeway, not knowing what the true facts were, as I understand it, suspended purchases from one shipper, not of all California table grapes, and the charge was made by UFWOC that all grapes were contaminated.

Senator MONDALE. Did they have some basis for their action?

Mr. GIUMARRA. Yes, they had the basis, I think, of an inaccurate report.

Senator Mondale. Was that a responsible and an honest reaction on their part?

Mr. GIUMARRA. It was a responsible and honest reaction to the UFWOC's irresponsible statement, namely, that the grapes had aldrin on them and this statement was based on the only test that had ever manifested such results in the history of this country.

Senator MONDALE. Four tests?

Mr. GIUMARRA. Pardon me?

Senator MONDALE. Four tests?

Mr. GIUMARRA. No, I am saying it was a responsible action to an irresponsible charge.

Senator MONDALE. They responded to their own test, did they not?

Mr. GIUMARRA. They responded to the charge presented to this subcommittee.

Senator MONDALE. They took their own samples.

Mr. GIUMARRA. Why did they take the test? Not out of the blue but because someone was warning, before this subcommittee, that the grapes had illegal residue on them.

Senator MONDALE. Is that because of the politics of it, or was it in order to defend the consumer?

Mr. GIUMARRA. No, because the charge was made.

Senator MURPHY. Would the Senator yield.

I would like to read into the record, I am reading now from Mr. Cohen's testimony when he first appeared before the committee. He said:

> I would like to summarize the main area of farmworkers concern. The reason for farmworkers testifying here is because we believe that the table grape industry in California is irresponsible in its use of economic poison, uses the wrong kind of poison, the wrong time and in the wrong amounts, and disregards the health of both consumer and workers.

Now this statement would be enough to make me, were I running a grocery store, to say, "Wait a minute, I better find out what I am selling." And they did suspend purchases of one shipper's grapes for I think a period of two weeks while they had their tests. Then they resumed the purchase, which would indicate to me that they were satisfied that there was not any dangerous and irresponsible use and disregard to consumers and workers.

Mr. GIUMARRA. Senator Murphy, you raise an important point and that is this: That the union at the very outset of its testimony made a charge that we were irresponsible in the use of pesticides, not only with respect to the farmworker in the field but more

importantly, from a pesticide campaign in terms of dissuading people to eat grapes, that we were selling grapes that had illegal residues.

To substantiate that charge, the union only comes forward with its own one test, which showed 18 parts per million of a chemical, called aldrin, not even used on the table grapes.

I would suggest that to substantiate a very, very serious charge, such as the union made, with evidence like that, which is only one test, without first going to the FDA and checking their tests throughout the country, and the State tests throughout the State, I think is an irresponsible act, and that is the reason for my claim in my news conference, and here, that this was a deceitful act.

Senator MURPHY. Mr. Chairman, if I may say, it was due to the good judgment of the Chairman that this matter was brought to the FDA and that the further tests were made which showed that there was some sort of an error, or a mystery here, which led to these hearings today which I think point out very clearly that there has been a very definite error, and there have been some mistakes made and some injuries done that possibly should not have been done.

Mr. GIUMARRA. And I thank the Chairman for asking the FDA to make those inspections because they did exonerate our industry and find that the grapes were certainly and truly safe.

Senator MONDALE. Does your statement deal with health risks to the farmworkers?

Mr. GIUMARRA. Indirectly it does, sir.

Senator MONDALE. Does it deal with it directly?

Mr. GIUMARRA. Well, I suppose you would have to define that but I will proceed with it and then we can determine.

Senator MONDALE. All right.

Mr. GIUMARRA. We have just discussed Dr. Porter's testimony and then I continue.

Even disregarding for the moment the scientific technicalities of the matter, the irrefutable fact is that aldrin is not used on California grapes.

Anthony A. Bianco, Jr., who grew the grapes in question, swears he has never used aldrin on any crop.

Mr. Allen Lemmon of the California State Department of Agriculture showed that aldrin is not used on grapes and that his Department's tests of grapes on the farm, in the transportation process, and in the markets, have never turned up aldrin.

The people who apply pesticides for the growers, and the agricultural commissioners of every county in California state that aldrin is not used on grapes.

Finally, the Food and Drug Administration, with its broad-scale tests and its widely recognized array of technical experts, processes, and equipment, have totally cleared the California table grape crop of charges that it is contaminated by aldrin—or that it is contaminated in any way whatsoever by pesticides, herbicides, and what Mr. Chevez called "economic poisons" of any kind.

This, then, is the evidence that disposes of UFWOC's pesticide charge and which destroys the credibility of Mr. Chavez' own

testimony before this committee and the dangerously irresponsible propaganda he is spreading in his travels about the country.

But this is only part of the story. The contrived pesticide issue represents a final desperate move in Mr. Chevez' campaign to grab control of the Nation's food production. The pesticide scare was obviously launched to shore up UFWOC's sagging boycott. UFWOC's stated concern for the farmworker and consumer is no more than a cynical weapon in its arsenal of trickery and deceit.

The first I personally heard of pesticides as an issue between the growers and UFWOC was about a year ago from Mr. Cohen himself. We were litigating a matter in superior court in Bakersfield, Calif., when Mr. Cohen warned me that UFWOC was considering launching the pesticide campaign which has now materialized.

At that time, however, he stated that UFWOC was being restrained from doing so by the AFL–CIO because such a campaign might destroy the industry. Mr. Cohen insisted that UFWOC could raise the issue in the future if the industry continued its refusal to negotiate with UFWOC, and that if UFWOC did, the grape industry would be faced with another cranberry situation.

And he warned that we could not beat this tactic because, he said, in the cranberry situation every time the Food and Drug Administration or the industry advised the public that cranberries were safe, sales of that commodity plunged even lower.

The ironic parts of all this is that apparently not only the AFL–CIO but Mr. Chavez himself opposed the use of this tactic by his followers.

On June 10, 1969, Mr. Cohen walked into the office of the South Central Farmers' Committee in Delano, Calif., and engaged in a conversation with Mrs. Eleanor Schulte, the committee's office manager.

At this point, Mr. Chairman, I would like to submit for the record Mrs. Schulte's affidavit regarding that conversation.

Senator MONDALE. For purposes of the printed record, I will order your entire statement, with all attachments, printed at the close of your remarks.

Mr. GIUMARRA. Mrs. Schulte notes therein that Mr. Cohen said his purpose was for Mrs. Schulte to pass along to the growers the conversation that took place between them.

I will also quote three brief paragraphs from Mrs. Schulte's affidavit:

> The Board of UFWOC (He [Cohen] mentioned the names of Larry, Dolores, and Phil whom I assume to be Larry Itliong, Dolores Huerta, and Phil Veracruz [All UFWOC officials]) had met the previous night and voted to mount an all-out campaign this year on the boycott, including the pesticide issue. Cesar did not want to push the pesticide issue, and tried to restrain the others but finally agreed to go ahead with it if necessary. The only alternative to this intensive campaign will be for the growers to negotiate. Cesar wants to avoid this intensification because it will be so destructive to both sides

And quote:

> He spoke of the "cranberry scare" and said that every time the Department of Agriculture issued a bulletin denying pesticide poisoning in cran-

berries, it only made the situation worse. He said we couldn't fight the pesticide issue.

And again I quote:

He said that the union had had conversations in the past with John Giumarra, Jr., and that "we told him we would make the boycott a national issue and he laughed. Then we told him that we would bring up the pesticide issue, and he laughted, but we did all these things."

Yes, Mr. Chairman and members of the committee, they did do all these things and more.

They have lied to the American people. They have deliberately distorted fact. They have libeled this industry and this commodity. And they have demonstrated the most vicious irresponsibility the agricultural community of this Nation has ever witnessed.

For example, consider the next document I will ask to be made part of this record. It is a handbill put out by UFWOC urging "Don't Eat Grapes." This handbill and thousands like it are flooding the country in a deliberate effort to frighten the American consumer and to destroy this industry.

In it, UFWOC charges the growers with using pesticides of a kind, and I quote, "developed by the Nazis during World War II" which "works just like war gases in its effect on human beings."

I am not a technical expert in pesticides but I do read the English language and I understand deliberately misleading propaganda when I see it. The same handbill says, "There are no inspection procedures and no safeguards to protect consumers from dangerous pesticide residuse remaining on grapes."

The testimony before this committee yesterday and today demonstrates the utter falsity of UFWOC's claims.

Along these lines, if UFWOC wants to talk about gases, I would like to tell you of an incident in our vineyards near Delano on August 26. A picking crew reported to a field for work and within a few moments many of the workers complained of feeling ill. Their eyes were watering and they were coughing. One worker attempted to use a portable field toilet which is provided for our workers, but was driven out in several seconds, tears streaming from his eyes.

The Hornkohl Laboratories of Bakersfield, chemical and testing engineers, were asked to analyze the problem because we fully anticipated that UFWOC would charge the incident up to pesticides in some fashion. A Hornkohl chemist, L. H. McAuley, said he was unable to remain in the toilet building for more than 3 seconds because of what he described as "a very pungent odor and burning effect of the eyes."

Laboratory tests (and I am submitting the Hornkohl certificate for the record, Mr. Chairman) showed that the portable toilet had been sprayed with an organic chemical with an aldehyde base. Aldehyde, I am told, is an abrasive agent, a basic ingredient in tear gas.

When Mr. McAuley attempted to leave the area with his sample, he was accosted by UFWOC supporters on the road outside the vineyard and warned to get rid of his sample. He refused, however, and was safely escorted from the area by one of our ranch officials.

Moreover, while Mr. McAuley was taking his samples, the same UFWOC group harangued the workers in the field with shouts asking: "Do your eyes burn? Do you have tears in your eyes?"

All I can say, Mr. Chairman, is that before Cesar Chavez and UFWOC came to the valley, our workers were not tear gassed in the fields.

Mr. Chavez knows that the pesticide issue is false. He is completely willing to have it go away—even without resolution on his terms—if he can whip the growers into submission and take his first step toward control of America's food production.

Proof that the is willing to throw away the pesticide issue is evidenced in the next document I now submit for the record.

In June and July of this year, 12 table grape growers entered into negotiation with UFWOC under the supervision of the Federal Mediation and Conciliation Service. Those negotiations failed. The evidence stemming from those negotiations demonstrates beyond question that UFWOC was willing to throw away the pesticide issue to get its first contracts with the table grape industry.

The document I submit is an August 6 press release by the labor relations consultant who represented the 12 growers in the negotiations. It states that UFWOC submitted an offer in writing through the Federal Mediation and Conciliation Service which read as follows:

That we are prepared to give a moratorium to the whole industry on the pesticide campaign for a limited time in exchange for an acceptable contract covering all workers, all crops.

Mr. Chairman, in closing I would submit the following:

The United Farm Workers Organizing Committee purports to represent the farmworkers, yet the majority of those workers have not chosen UFWOC as their collective-bargaining agent. The charges by UFWOC on wages, working conditions, pesticides and the rest only obscure the real issue.

We, the growers, favor Federal legislation that would allow the farmworkers in the vineyards of California, and, indeed, the Nation, to state whether they want UFWOC as their representative, or some other union, or no union at all.

This should be part of a comprehensive legislative program dealing with the whole issue of employer-employee relations in agriculture and the right of the American consumer to the free flow of food from the farm to market.

Only if the Congress takes action can this controversy be ended forever.

Thank you very much, Mr. Chairman.

Senator Mondale. Senator Murphy.

Senator Murphy. I have only one question: Yesterday there was testimony that the farm employees in California could obtain no relief under workmen's compensation laws if injured while working in the fields by pesticides.

Is that item true?

Mr. Giumarra. Senator Murphy, that is absolutely false. That was

a statement made yesterday before the committee by Mr. Chavez. He said the farmworkers do not have the protection of workmen's compensation in California, particularly with respect to the pesticide issue. That is absolutely false.

California is one of the few States throughout the country that provides absolute and total coverage of all farmworkers in that State by workmen's compensation and that includes any injury that they might sustain on the job, whether it be pesticides or whether they trip and fall down or whatever it might happen to be.

I might add that even if they are injured off the job, not necessarily by pesticides or in any accident, they are also covered by State disability insurance, and I might also add that California is one of the few States in the United States that provides such coverage for farmworkers.

While I am on the subject, let me just elaborate in this respect. The statement was also made that the farmworker cannot determine what pesticides are being used and as evidence of that Mr. Cohen testified that he went to the agricultural commissioner and asked for all of his records with respect to what pesticides were being used, when they were used, by whom they were applied, the amounts used, the manufacturer, and the like. That is not accurate in this respect, and in a very important respect. Any farmworker in the county of Kern, where we are located, who thinks he has a pesticide injury, of any injury that might in any way relate to pesticides indirectly, even, can go to the county agricultural commissioner—or his doctor can go—or the workmen's compensation board, and ask the county agricultural commissioner what pesticides were used on such and such a ranch at such and such a time, and in what amounts, the manufacturer who applied it, every single detail—the date, the wind direction, every minute detail—and the county agricultural commissioner will disclose it to the farmworker or to his doctor or to the workmen's compensation board.

The reason that the county agricultural commissioner did not disclose all of his records to Mr. Cohen was that Mr. Cohen walked into the office purporting to represent farmworkers throughout the county, all of the farmworkers, and wanted records on all ranches, all pesticide applications under all circumstances; and for very good reason the county commissioner was not obliged to do so.

I might bring up another point while we are on this subject, because it has been raised and that is this: Before a subcommittee like this, without any kind of cross-examination on any rules of evidence, a man like Mr. Cohen can come in here and testify that people are being poisoned all over the fields and he can testify that farmworkers—Mr. Jones, Mr. Brown, Mr. Gonzales, or whoever it might be—complained they had pesticide poisoning. But in a case in a court of law, where there is the right of cross-examination, one must present evidence which will withstand the careful and searching scrutiny of the judge and jury.

Such a case was brought in Kern County when Mr. Cohen attempted to obtain these pesticide records from the Kern County

agricultural commissioner. Mr. Cohen alleged in the complaint that 95 farmworkers were injured by pesticides during the preceding year, and he alleged he needed to obtain the commissioner's records in order to prove that the injuries were related to the pesticide applications.

The judge heard all of the evidence. Mr. Cohen did not bring in one single individual to testify that they had been injured. He did not bring in one single doctor to testify that someone had been treated. He only brought in one public health official who read off the names of 95 people where the evidence tended to indicate that they had pesticide implications of some kind.

It turned out, interestingly enough, that 80 out of the 95 people were directly employed by commercial applicators, such as airplane pilots, such as people who loaded the airplane, such as the flagmen sometimes used to direct the flier and hired by the pesticide company. Only 15 out of the 95 were in any way related to farmworkers, and of the 15 in almost every single case the only evidence of injury at all, or any symptom at all was related to sulphur. Sulphur is nontoxic and noninjurious. It causes, in some cases sneezing, and it can cause watering of the eyes, but it is not injurious.

Senator MONDALE. You have heard the statistics presented by the Department of Health, Education, and Welfare that possibly as many as 800 people die, at least, annually from pesticides, and that possibly as many as 80,000, at least, are injured. You have heard of the doctor's survey in Kern County that showed that 80 percent of the people surveyed suffered symptoms of pesticide poisoning. You have heard of the results of Dr. West's surveys of occupational diseases in California.

On the basis of this, and whatever else you might know, how are you prepared to describe the extent of risk to which a farmworker is exposed in terms of pesticides in the table-grape industry?

Mr. GIUMARRA. Senator Mondale, the HEW did not testify that there were 800 deaths a year and 80,000 injuries per year; you stated that. They testified, and I cite page 67 of the transcript of the hearing record, the HEW cited 150 to 200 deaths per year relating to pesticide injuries throughout the entire United States—and not just in agriculture, I might add, in all of the United States; in the cities, on the farms, everywhere.

You cited then on page 68, and I quote you, in response to the HEW testimony that there were 150 to 200 deaths per year, you say, "I think so, where I read or heard of a specialist in the field who says he thinks those estimates are about 400 percent under the actual deaths and injuries attributable to pesticides."

And then you asked the HEW if that is true, and they said they didn't know.

And I suggest there are not 800 deaths per year and 80,000 injuries.

I suggest that there are no accurate figures in the United States. I also suggest to you that of the 150 to 200 deaths in the United States, that a substantial number of those are children in the urban area who have taken ant poison, roach poison, who have spray cans

of DDT and other things that are sold to the consumer in the marketplace, and it does not specifically relate to the farmworker.

Now with respect to the reports——

Senator MONDALE. Will you please yield right there?

Mr. GIUMARRA. Yes.

Senator MONDALE. I didn't want to disclose this but the statistician who was being questioned told me privately that he estimated 800 deaths and 80,000 injuries at least, so when I referred vaguely to a source of statistics, I was referring to his comment in order to avoid embarrassing him. He went on later, I think, and confirmed in his testimony that those figures would not be an improper estimate.

In any event, let me just be sure I understand your testimony.

Mr. GIUMARRA. The only reason I cited that is because I don't want to be using figures that may not even be accurate. I don't know what the figures are, and I don't think you do, and I don't think the statistician does, accurately.

Senator MONDALE. You don't think he does either?

Mr. GIUMARRA. It has never been published; no. As he indicates in the record there has been no final summary. I am only trying to be accurate, Mr. Chairman.

Senator MONDALE. I can see that.

What is your appraisal of the risk to farmworkers from pesticide poisoning? Is it a minimum thing? Is it a serious thing? Is it something which is being adequately dealt with now? Are the farmworkers raising a phony issue when they talk about the risk to their health? Are these surveys by Dr. West, these specific examples which Mr. Chavez has indicated of reactions to pesticide poisoning, have these been exaggerated?

Mr. GIUMARRA. I would say this, Mr. Chairman: That the issue of pesticide residues on farm products, particularly table grapes, is a phony issue, yes. I would unequivocally state that it is part of a campaign to scare people away from eating table grapes.

Senator MONDALE. Would you say there is no evidence of ill health by farmworkers in the table-grape industry in California from pesticide exposure? Is that what you are saying?

Mr. GIUMARRA. That is the next issue I am coming to.

Senator MONDALE. Would you say that is your answer?

Mr. GIUMARRA. No, I would say that just like any occupation, whether it be industry or whether it be in agriculture, there are certain risks and hazards and I would say——

Senator MONDALE. How would you describe those in the table-grape industry?

Mr. GIUMARRA. I would say in the table-grape industry those risks and hazards are fairly minimal for this reason: Most of the chemicals that we use are not of the extremely dangerous nature. As an example, parathion.

In 1969 on our ranch in particular we did not use one drop of parathion. Not only that, but we are extremely careful in our industry to adhere to the rules and regulations set down by the Food and Drug Administration, by the State government, by the county agricultural commissioners. If there is substantial evidence

that farmworkers—and I might remind you that the evidence that investigators are supposedly finding is not necessarily limited to the grape industry, although I think you did cite one report of Mrs. West's relating to the grape industry—I might indicate that if there is substantial evidence that shows that farmworkers are indeed engaged or exposed to greater dangers than they should be and if this is a real problem, then I would suggest that supplemental laws be enacted.

Senator MONDALE. "If this is," by that you are implying it is not?

Mr. GIUMARRA. I don't think it is. No, I do not.

Let me give you an example: Mr. Bianco said, and I think it is a very valid point, he does not want to commit suicide, and the reason that Mr. Bianco said that is the same reason my uncle, who is the president of our company, 70 years old and working 16 hours a day, does not want to commit suicide. They are the first ones in the field.

After this material is applied and after the designated time goes by, they are the first ones in the field to check to see if it had a beneficial effect. Then during the course of a working day they are in the field because the farmers for the most part in California are not absentee landlords, they are people who actually live with their crops; that is a part of their lives, they work with the farmworkers, know them by name, year in and year out—not everyone by name, obviously. So to the best of my knowledge, no farmer has ever had pesticide poisoning, and he is exposed more than the farmworkers. That is one point.

Senator MONDALE. In other words, you are satisfied that there is no serious risk to the farmworkers' health from pesticide exposure?

Mr. GIUMARRA. Not if the farmer adheres to the rules and regulations set down by the various governmental agencies.

Senator MONDALE. Would you see any need for improving the law giving the farmworker any rights beyond those he now has expanding the powers, or in any other way changing the powers of Federal or State government to protect the worker from pesticide exposure?

Mr. GIUMARRA. I would say this, that we shoud never be complacent about anything, whether it is automobile safety or whether it is pesticide safety.

I think you cited the Automobile Safety Act yesterday, the Coal Mine Safety Act was cited. You as Senators and we as citizens should never be complacent about anything in this country because we can always improve. I think that tests should be always be undertaken and not only on pesticides but in many other areas. I would welcome tests in the table-grape industry in other parts of agriculture to clear up this issue once and for all, and indeed if there are any breaches in the protection against pesticide poisoning of farmworkers, I would want it disclosed and I would want regulations passed and we will adhere to those regulations and rules, whether they be by your subcommittee on the Federal level or whether it be out in California.

But I think that to raise this as a dual issue, that pesticides are being used—that is the first step—and farmworkers are being

poisoned. And why are they being poisoned? Because there are residues on the grapes—of, my, just tons of it, and therefore if you eat the grapes you are going to drop dead. That is irresponsibility, sir.

I submit that if you would like any cooperation from us in our industry with respect to providing information, we will certainly be cooperative as we have cooperated with governmental agencies in the past. As to our commercial applicators, as an example, let me give you one example: Mr. Cohen raised the point that the farmers don't have to disclose anything to the Kern County agricultural commissioner. An important reason for this is that for the most part the commercial applicators do almost all the spraying themselves. They must report on a monthly basis every single detail, and in Kern County it goes to the extent of the pesticide applicators turning in the invoices which is the invoice that they give to the grower, they turn that over to the Kern County agricultural commissioner, which has every minute detail, and more than is even required by California law because the commissioner requested it about 6 or 7 years ago.

I think we go a long way toward trying to protect our workers; you are not the only one interested in their welfare, obviously.

Senator MONDALE. Aren't I? [Laughter.]

Mr. GIUMARRA. No, you are a subcommittee, you are Senators. We as farmers are just as interested as you are. Why? First of all, we don't want to injure anyone. I think that is obvious.

Secondly, from an economic standpoint, it is sheer absurdity to provide working conditions in which your people get sick, because if they get sick they will leave. There are thousands of farms in California and there is a labor shortage, particularly for people in the grape industry who are skilled workers. They could go to any other ranch in that area. So certainly from an economic standpoint we would not want to do anything like that.

There is even another economic standpoint I will raise: workmen's compensation. Every time there is an injury covered by workmen's compensation—and all farmworkers are covered by workmen's compensation—the workmen's compensation bureau awards a money judgment for doctor fees and off-work time and the like. Our insurance premiums skyrocket. It is affected directly each time.

So from an economic standpoint we go out of our way to protect people, make sure there are no injuries. Our insurance premiums have been going up on packing sheds—one out of two burned down and 15 or 20 of our trucks have blown up and numerous activities like that—but on our workmen's compensation insurance the premiums have not gone up very much because there have not been pesticide injuries.

Senator MONDALE. Senator Cranston.

Senator CRANSTON. I have no questions.

Senator MONDALE. Senator Murphy.

Senator MURPHY. I have no questions.

I would like to say that I would like to congratulate you, Mr. Giumarra, because your testimony here I think has been straightforward, it has been logical. I think it has been presented in a manner that is proper before a Senate committee. Obviously your training

has put you in good stead, your background being a family of growers in Kern County has helped a great deal, and I am very thankful that you came along as a witness today.

Mr. GIUMARRA. And I thank you very much, Senator.

Senator MURPHY. I am proud of our State, I am proud of the farmers in our State. I know there are some bad fellows here or there but by and large we have the best working conditions of any State in the Union; we pay the highest wages, we have the best conditions. I am glad that your testimony is here today in the record to help clear up this entire situation.

As I say, I am almost back where I started. I still don't know how the aldrin got on the first group of grapes.

Mr. GIUMARRA. We may never know.

Senator MURPHY. So we have done a complete circle.

Senator MONDALE. One final comment. Would you submit for the record the acreage of the total Giumarra Corp. holdings, the estimated net worth, and the gross sales? If you will, please submit that for the record.

Mr. GIUMARRA. The estimated net worth, I am not authorized to do that. I would have to check with my family. I don't think it is really relevant to how 18 parts per million on somebody else's grapes that arrived in Washington, D.C.

Senator MONDALE. You don't intend to respond?

Mr. GIUMARRA. To that question?

Senator MONDALE. Yes.

Mr. GIUMARRA. What is the relevance of that question, sir?

Senator MONDALE. I asked for it.

Senator GIUMARRA. Oh. Well, I don't mean to be disrespectful but because you ask it, that doesn't make it relevant. I mean does it have to do with pesticides?

Senator MONDALE. In my opinion, one beauty about a Senate committee is that we try to take a look at the whole picture. One of the things I would like to know is the size of your operation, the acreage, net worth, the total volume.

Mr. GIUMARRA. We farm about 5,000 acres of table grapes, it is run entirely by my family—Joe Giumarra, Sal Giumarra, John Giumarra, George Giumarra, George Giumarra, Jr., John Giumarra, Jr., Dominic Corserve, Dave Danly, John Murray.

Senator MONDALE. What are your annual gross sales?

Mr. GIUMARRA. I would imagine it is around $12 million.

Senator MURPHY. We generally reserve these kinds of questions for people who are to be appointed to the executive branch.

Mr. GIUMARRA. I might add that the $12 million, most of that is represented by grapes that are shipped throughout the world, and are enjoyed by people everywhere.

Thank you very much.

Senator MONDALE. Thank you, Mr. Giumarra. At this point, I order printed in the hearing record your remarks in their entirety, along with the attached exhibits. I also submit a prepared statement by Congressman John V. Tunney to be printed in the record at this point.

(The material referred to follows:)

STATEMENT OF JOHN G. GIUMARRA, JR.
General Counsel
Giumarra Vineyards Corporation
Edison, California

Before the Senate Subcommittee on Migratory Labor
Washington, D. C.
September 30, 1969

* * * * * *

I am John G. Giumarra, Jr., a resident of Bakersfield, California, and General Counsel of Giumarra Vineyards Corporation. We are grape growers in the Arvin and Delano regions of Kern County and are one of the many targets of the United Farm Workers Organizing Committee boycott effort.

Despite that boycott effort and intensive efforts by UFWOC to organize our workers and other farm workers in California and across the nation, our crops--and the total crop of the table grape industry--have been harvested and marketed in each of the past four years. Our 1969 crop is similarly flowing to market right now as Mr. Cesar Chavez and UFWOC trumpet their strike and boycott calls before this committee and in the marketplaces of the nation.

This crop is moving because UFWOC has failed in each and every phase of its campaign and is now resorting to cynical and desperate tactics to keep its cause alive.

UFWOC has failed in the fields where it has been unable to win over the workers and unable to halt the production or harvest of grapes

UFWOC has failed with the boycott because the consumers of America want grapes and will eat them if they are for sale. UFWOC has further failed in the marketplace because the stores of America have stood up under the worst kind of coercion, refusing to serve as arbiters in a dispute which is not of their making and refusing to deny freedom of choice to the consumer.

Now, as this hearing has established beyond doubt, Mr. Chavez and UFWOC, in a last ditch effort to buoy up their cause, have recklessly leveled the false charge that the grape growers are poisoning the American people. Mr. Chavez has come to Washington to testify before the highest legislative body in the land in an attempt to use this revered place as the staging ground for an effort which could well destroy the table grape industry and the livelihood of the farm workers for whom he professes such deep concern.

That tactic has failed because of the diligence this Subcommittee has shown in pursuing the truth. His defamatory charge against this industry is based on the flimsiest possible evidence--Mr. Chavez' single laboratory analysis and one four-pound sample from nearly a billion pounds of California table grapes. And indeed even this test was demonstrated to be inaccurate.

Let us look at that evidence:

Dr. Paul E. Porter, a world renowned chemist and unimpeachable expert in pesticides, has refuted beyond question the charge that California table grapes are contaminated by aldrin. His scientific expertise brought down to language everyone can understand proves that the test cited to this committee on August 1 was either in error, or that the grapes were deliberately doctored by someone.

Even disregarding for the moment the scientific technicalities of the matter, the irrefutable fact is that aldrin is not used on California grapes.

Anthony A. Bianco, Jr., who grew the grapes in question, swears he has never used aldrin on any crop.

Mr. Allen Lemmon of the California State Department of Agriculture showed that aldrin isn't used on grapes and that his department's tests of grapes on the farm, in the transportation process and in the markets, have never turned up aldrin.

The people who apply pesticides for the growers, and the agricultura commissioners of every county in California state that aldrin isn't used on grapes.

Finally, the Food and Drug Administration, with its broad scale tests and its widely recognized array of technical experts, processes and equipment have totally cleared the California table grape crop of charges that it is contaminated by aldrin--or that it is contaminated in any way whatsoever by pesticides, herbicides and what Mr. Chavez calls "economic poisons" of any kind.

This then is the evidence that disposes of UFWOC's pesticide and which destroys the credibility of Mr. Chavez' own testimony before this committee and the dangerously irresponsible propaganda he is spreading in his travels about the country.

But this is only part of the story. The contrived pesticide issue represents a final desperate move in Mr. Chavez' campaign to grab control of the nation's food production. The pesticide scare was obviously launched to shore up UFWOC's sagging boycott. UFWOC's stated concern for the farm worker and consumer is no more than a cynical weapon in its arsenal of trickery and deceit.

The first I personally heard of pesticides as an issue between the growers and UFWOC was about ayear ago from Mr. Cohen himself. We were litigating a matter in Superior Court in Bakersfield, California, when Mr. Cohen warned me that UFWOC was considering launching the pesticide campaign which has now materialized. At that time, however, he stated that UFWOC was being restrained from doing so by the AFL-CIO because such a campaign might destroy the industry. Mr. Cohen insisted that UFWOC could raise the issue in the future if the industry continued its refusal to negotiate with UFWOC and that if UFWOC did, the grape industry would be faced with another cranberry situation.
And he warned that we couldn't beat this tactic because, he said, in the cranberry situation every time the Food and Drug Administration or the industry advised the public that cranberries were safe, sales of that commodity plunged even lower.

The ironic part of all this is that apparently not only the AFL-CIO but Mr. Chavez himself opposed the use of this tactic by his followers.

On June 10, 1969, Mr. Cohen walked into the office of the South Central Farmers Committee in Delano, California, and engaged in a conversation with Mrs. Eleanor Schulte, the committee's office manager.

(At this point, Mr. Chairman, I would like to submit for the record Mrs. Schulte's affidavit regarding that conversation.)

Mrs. Schulte notes therein that Mr. Cohen said his purpose was for Mrs. Schulte to pass along to the growers the conversation that took place between them.

I will also quote three brief paragraphs from Mrs. Schulte's affidavit:

(Quote) "The Board of UFWOC (He /Cohen/ mentioned the names of Larry, Dolores and Phil whom I assume to be Larry Itliong, Dolores Huerta and Phil Veracruz /All UFWOC officials/ had met the previous night and voted to mount an all-out campaign this year on the boycott, including the pesticide issue. Cesar did not want to push the pesticide issue, and tried to restrain the others but finally agreed to go ahead with it if necessary. The only alternative to this intensive campaign will be for the growers to negotiate. Cesar wants to avoid this intensification because it will be so destructive to both sides." (End quote)

(And quote) "He spoke of the 'cranberry scare' and said that every time the Department of Agriculture issued a bulletin denying pesticide poisoning in cranberries, it only made the situation worse. He said we couldn't fight the pesticide issue..." (End quote)

(And again I quote) "He said that the union had had conversations in the past with John Giumarra, Jr. and that 'we told him we would make the boycott a national issue and he laughed. Then we told him that we would bring up the pesticide issue, and he laughed, but we did all these things'."

Yes, Mr. Chairman and members of the committee, they did do all these things and more.

They have lied to the American people. They have deliberately distorted fact. They have libeled this industry and this commodity. And they have demonstrated the most vicious irresponsibility the agricultural community of this nation has ever witnessed.

For example, consider the next document I will ask to be made part of this record. It is a handbill put out by UFWOC urging "Don't Eat Grapes." This handbill and thousands like it are flooding the country in a deliberate effort to frighten the American consumer and to destroy this industry.

In it, UFWOC charges the growers with using pesticides of a kind, and I quote, "developed by the Nazis during World War II" which "works just like war gases in its effect on human beings."

I am not a technical expert in pesticides but I do read the English language and I understand deliberately misleading propaganda when I see it. The same handbill says "There are no inspection procedures and no safeguards to protect consumers from dangerous pesticide residues remaining on grapes." The testimony before this committee yesterday and today demonstrate the utter falsity of UFWOC's claims.

By the way, if UFWOC wants to talk about gases, I'd like to tell you of an incident in our vineyards near Delano on August 26. A picking crew reported to a field for work and within a few moments many of the workers complained of feeling ill. Their eyes were watering and they were coughing. One worker attempted to use a portable field toilet which is provided for our workers, but was driven out in several seconds, tears streaming from his eyes.

The Hornkohl Laboratories of Bakersfield, chemical and testing engineers, were asked to analyze the problem because we fully anticipated that UFWOC would charge the incident up to pesticides in some fashion. A Hornkohl chemist, L. H. McAuley, said he was unable to remain in the toilet building for more than three seconds because of what he described as "a very pungent odor and burning effect of the eyes."

Laboratory tests (And I am submitting the Hornkohn certificate for the record, Mr. Chairman) showed that the portable toilet had been sprayed with an organic chemical with an aldehyde base. Aldehyde, I am told, is an abrasive agent, a basic ingredient in tear gas.

When Mr. McAuley attempted to leave the area with his sample, he was accosted by UFWOC supporters on the road outside the vineyard and warned to get rid of his sample. He refused, however, and was safely escorted from the area by one of our ranch officials. Moreover, while Mr. McAuley was taking his samples, the same UFWOC group harangued the workers in the field with shouts asking: "Do your eyes burn?" "Do you have tears in your eyes?"

All I can say, Mr. Chairman, is that before Cesar Chavez and UFWOC came to the valley, our workers were not tear gassed in the fields.

Mr. Chavez knows that the pesticide issue is false. He is completely willing to have it go away--even without resolution on his terms--if he can whip the growers into submission and take his first step toward control of America's food production.

Proof that he is willing to throw away the pesticide issue is evidenced in the next document I now submit for the record.

In June and July of this year, 12 table grape growers entered into negotiation with UFWOC under the supervision of the Federal Mediation and Conciliation Service. Those negotiations failed. The evidence stemming from those negotiations demonstrates beyond question that UFWOC was willing to throw away the pesticide issue to get its first contracts with the table grape industry.

The document I submit is an August 6 press release by the labor relations consultant who represented the 12 growers in the negotiations. It states that UFWOC submitted an offer in writing through the Federal Mediation and Conciliation Service which read as follows:

"That we are prepared to give a moratorium to the whole industry on the pesticide campaign for a limited time in exchange for an acceptable contract covering all workers, all crops."

Mr. Chairman, in closing I would submit the following:

The United Farm Workers Organizing Committee purports to represent the farm workers yet the majority of those workers have not chosen UFWOC as their collective bargaining agent. The charges by UFWOC on wages, working conditions, pesticides and the rest only obscure the real issue.

We, the growers, favor federal legislation that would allow the farm workers in the vineyards of California, and, indeed, the nation, to state whether they want UFWOC as their representative, or some other union, or no union at all. This should be part of a comprehensive legislative program dealing with the whole issue of employer-employee relations in agriculture and the right of the American consumer to the free flow of food from the farm to market.

Only if the Congress takes action can this controversy be ended forever.

# # # #

STATE OF CALIFORNIA)
: ss AFFIDAVIT OF
COUNTY OF KERN) ELEANOR M. SCHULTE

ELEANOR M. SCHULTE, being first duly sworn, deposes and says:

THAT I AM THE OFFICE MANAGER OF SOUTH CENTRAL FARMERS COMMITTEE;

MR. JEROME COHEN CAME TO THE SOUTH CENTRAL FARMERS COMMITTEE OFFICE AT APPROXIMATELY 3:30 P.M., JUNE 10, 1969, ASKED FOR ME BY NAME AND SAID HE WANTED TO TALK TO ME. HE SAID HIS PURPOSE WAS TO HAVE ME PASS ALONG TO OUR GROWERS THE CONVERSATION. IN MOST CASES I CANNOT QUOTE HIM VERBATIM, BUT THE SUBSTANCE IS ACCURATE.

HE MADE THESE POINTS ON PESTICIDES:

--THE BOARD OF UFWOC (HE MENTIONED THE NAMES LARRY, DOLORES AND PHIL, WHOM I ASSUME TO BE LARRY ITLIONG, DOLORES HUERTA AND PHIL VERACRUZ) HAD MET THE PREVIOUS NIGHT AND VOTED TO MOUNT AN ALL-OUT CAMPAIGN THIS YEAR ON THE BOYCOTT, INCLUDING THE PESTICIDE ISSUE. CESAR DID NOT WANT TO PUSH THE PESTICIDE ISSUE, AND TRIED TO RESTRAIN THE OTHERS, BUT FINALLY AGREED TO GO AHEAD WITH IT IF NECESSARY. THE ONLY ALTERNATIVE TO THIS INTENSIVE CAMPAIGN WILL BE FOR THE GROWERS TO NEGOTIATE. CESAR WANTS TO AVOID THIS INTENSIFICATION BECAUSE IT WILL BE SO DESTRUCTIVE FOR BOTH SIDES.

--HE SPOKE OF THE "CRANBERRY SCARE" AND SAID THAT EVERY TIME THE DEPARTMENT OF AGRICULTURE ISSUED A BULLETIN DENYING PESTICIDE POISONING IN CRANBERRIES, IT ONLY MADE THE SITUATION WORSE. HE SAID WE COULDN'T FIGHT THE PESTICIDE ISSUE, AND EVEN "BAXTER AND WHITAKER" WOULD NOT BE ABLE TO WAGE AN EFFECTIVE CAMPAION AGAINST IT.

--HE CLAIMS THAT TRACES OF DDT HAVE BEEN FOUND IN GRAPES, AND THAT DDT HAS BEEN FOUND TO CAUSE CANCER IN MAMMALS. HE MENTIONED THAT THE "AMERICAN EAGLE, THE SYMBOL OF AMERICA" IS BEING KILLED OFF BY DDT. HE SAID SUITS HAVE BEEN FILED ON DDT, AND MORE WILL BE FILED. I ASKED HIM IF NEGOTIATING WITH THE UNION WOULD RENDER PESTICIDES HARMLESS, AND HE SAID THAT THE HEALTH AND WELFARE CLAUSES IN THE CONTRACTS COULD PROVIDE SAFETY CONTROLS THAT WILL PROTECT BOTH THE WORKER AND THE CONSUMER.

--HE HINTED THAT UFWOC COULD SCARE THE WITS OUT OF THE AMERICAN PUBLIC WITH THE THREAT OF PESTICIDE POISONING, AND WE COULDN'T DO ANYTHING ABOUT IT.

--WHEN THE PESTICIDE ISSUE CAME UP WITH SELDON MORLEY, THE KERN COUNTY AGRICULTURAL COMMISSIONER, UFWOC TRIED FOR NINE MONTHS TO SETTLE THINGS QUIETLY, BUT MR. MORLEY AND HIS PEOPLE WOULD NOT COOPERATE AND THEREBY FORCED THE UNION, AGAINST ITS WISHES, TO BRING THE CASE INTO COURT AND INTO THE PUBLIC EYE.

--HE SAID THE UNION HAD HAD CONVERSATIONS IN THE PAST WITH JOHN CIUMARRA, JR., AND THAT "WE TOLD HIM WE WOULD MAKE THE BOYCOTT A NATIONAL ISSUE,

AND HE LAUGHED, THEN WE TOLD HIM WE WOULD BRING UP THE PESTICIDE ISSUE, AND HE LAUGHED, BUT WE DID ALL THESE THINGS." HE SAID HE HOPED I WOULD BE MORE EFFECTIVE IN PASSING ALONG TO THE GROWERS HIS MESSAGE. HE SAID SOMETHING ABOUT ESTABLISHING A LINE OF COMMUNICATIONS, AND THAT I COULD TURN MY OFFICE INTO A NEGOTIATING CENTER. I GOT THE FEELING HERE THAT HE WAS TRYING TO SEE IF HE COULD DETECT WHETHER OR NOT HE COULD GIVE ME DELUSIONS OF GRANDEUR ABOUT BEING THE KEY FIGURE IN ENDING THE WHOLE MESS. HE SAID THE GROWERS DO NOT NEED TO BE SO FEARFUL OF NEGOTIATING. HIS EXACT WORDS WERE "THE GROWERS SEEM TO FEEL THAT IF THEY SIT DOWN TO A NEGOTIATING TABLE WITH THE UNION THEY WILL LOSE THEIR VIRGINITY."

--I ASKED HIM AGAIN HIS PURPOSE IN VISITING ME AND HE SAID IT WAS TO HAVE ME PASS ALONG TO THE GROWERS THE MESSAGE THAT IF WE DO NOT NEGOTIATE, THE UNION WILL PRESS THE BOYCOTT AND THE PESTICIDE CAMPAIGN, WHICH WILL BE NEEDLESSLY DESTRUCTIVE FOR BOTH SIDES.

Eleanor M. Schulte
ELEANOR M. SCHULTE

OFFICIAL SEAL
JOYCE M. McPHERSON
NOTARY PUBLIC-CALIFORNIA
PRINCIPAL OFFICE IN
KERN COUNTY

Subscribed and Sworn to before me this
23rd day of September, 1969

Joyce M. McPherson Notary Public
In and for the County of Kern, State of California
JOYCE M. McPHERSON
My Commission Expires Mar. 16, 1970

EXpress 9-5192
EXpress 9-5193

DATELAND CHEMICAL
ORTHO PRODUCTS
P. O. BOX 323 / HIGHWAY 111 & AVENUE 54 / THERMAL, CALIFORNIA

INSECTICIDES
FERTILIZERS
WEED KILLERS
FUNGICIDES

TO WHOM IT MAY CONCERN:

Richard Bagdasarian Inc., Mali Basta Ranch, and Mr. Grape Vineyards Inc. for the past five years have never purchased Aldrin Insecticide in any form. Nor have we carried this product in any form in our Inventory.

Mr. Mike Bozick owner of Mali Basta Ranch and General Manager of Richard Bagdasarian Inc. and Mr. Grape Vineyards Inc. has personally supervised all applications of pesticides on the above menticned ranches.

Having been in the Agricultural Chemical business in Coachella Valley for the past 11 to 12 years we have never had the occasion to stock or sell this product.

Yours very truly,

DATELAND CHEMICAL

V. Duane McFadden

V. Duane McFadden

Martin S. Grunnet, Jr.

Martin S. Grunnet, Jr.

Statement of Michael Bozick.

This will certify that I, Michael Bozick, owner of the Male Basta Ranch and General Manager of Richard Bagdasarian, Inc. and Mr. Grape Vineyards, Inc., have not purchased, obtained or received the chlorinated hydrocarbide Aldrin and have not applied, administered or used Aldrin in any of my fields during the past four years. Aldrin has not been authorized for use on my property in any form or method during that period.

I have personally supervised all applications of pesticides on our ranches during the past four years. These applications were made with our equipment by our employees and there has been no use of the chemical Aldrin during that period.

Dated: September 25, 1969

Michael Bozick, Vice President
of Richard Bagdasarian, Inc. and
Mr. Grape Vineyards, Inc.

STATE OF CALIFORNIA)
) ss.
COUNTY OF RIVERSIDE)

On September 25, 1969, before me, the undersigned, a Notary Public in and for said County and State, personally appeared Michael Bozick, known to me to be the Vice President of Richard Bagdasarian, Inc. and Mr. Grape Vineyards, Inc., the corporation that executed the within instrument, known to me to be the person who executed the within instrument on behalf of the corporations therein named, and acknowledged to me that such corporation executed the within instrument pursuant to its By-Laws or a resolution of its Board of Directors.

WITNESS my hand and official seal.

Ethel S. Beal
Notary Public in and for said
County and State.

OFFICIAL SEAL
ETHEL S. BEAL
NOTARY PUBLIC-CALIFORNIA
PRINCIPAL OFFICE IN
RIVERSIDE COUNTY

ETHEL S. BEAL
My Commission Expires Feb. 6, 1970

HORNKOHL LABORATORIES, Inc.
CHEMICAL AND TESTING ENGINEERS
714 TRUXTUN AVENUE
BAKERSFIELD, CALIFORNIA 93302

RECEIVED

September 2, 1969

By_____

Laboratory No. 198931 *Marked* As shown below

Sample. Unknown Compound

Received August 26, 1969

Submitted by Giumarra Vineyards Corporation
P. O. Box 98
Edison, California 93220
Attn: John Giumarra, Jr.

* * * * * * *

IDENTIFICATION OF UNKNOWN COMPOUND

Introduction: On August 26th, 1969, Hornkohl Laboratories, Inc. was requested by Giumarra Vineyards Corporation to travel to Delano in order to sample, analyze and identify an unknown compound.

Analysis: Upon arriving at the designated place, Mr. L. H. McAuley of Hornkohl Laboratory contacted Mr. Lloyd Hill who directed Mr. McAuley to the portable unit in question, identified as Unit #343. After arriving at Unit No. 343, Mr. Hill asked Mr. McAuley to enter and close the door for a few moments to determine the nature of the fumes within the unit.

Mr. McAuley was unable to remain inside for any great length of time due to the very pungent odor and a burning effect of the eyes experienced immediately upon entering the unit. The total time spent in the unit did not exceed 3 seconds.

Rightaway, Mr. McAuley reported to Mr. Hill that due to the high concentration within the unit and the burning effect of the eyes and face, he would be unable to remain inside for a lengthy time, and advised at this time that he would obtain a sample from within the unit and return it to the laboratory for further analysis. When leaving the area with the sample contained in a liter bottle, Mr. McAuley was advised to dispose of the bottle by a group of people, other than the pickers themselves, that were gathered at the side of the road.

HORNKOHL LABORATORIES, INC.
CHEMICAL AND TESTING ENGINEERS
714 TRUXTUN AVENUE
BAKERSFIELD, CALIFORNIA 93302

Mr. McAuley was escorted by Mr. Hill for approximately 3 miles, then continued alone to the laboratory to complete the analysis.

After many tests were performed on the sample, the unknown compound could be identified as follows:

Remarks and Conclusions: Based on the laboratory tests that were performed, it it reasonable to conclude that the compound is of an organic nature with an aldehyde base.

When summarizing the various laboratory tests, the burning sensation, etc., the compound appears to have the characteristics of an organic chemical known as Acrolein 'Acrolein'. This chemical is known to have a very pungent odor, and irritating to the eyes and mucosa. No chronic ill effects, other than the ones mentioned above have been reported to date.

Approved by,
Heinz D Pickel
Heinz D Pickel, Chief Chemist

Respectfully submitted,
HORNKOHL LABORATORIES, INC.
L.V. McAuley
L. V. McAuley,
Asst. Laboratory Supervisor

LEM:ap

acrolein is a
tear gas - type material

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DONT EAT GRAPES

WHAT YOU SHOULD KNOW ABOUT PESTICIDE POISONS ON GRAPES

Organophosphates

There are 3 kinds of poisons which grape growers use on their grapes.
The first kind was developed by the Nazis during World War II and works just like war gases in its effect on human beings.

The names of these pesticides are parathion, malathion, and tetraethyl pyrophosphate.

PARATHION is used widely in grape vineyards. One drop of parathion will cause death. Parathion is the poison that killed 19 children in Tijuana, Mexico a few years ago when they ate bread from wheat that had parathion residue on it.

Chlorinated Hydrocarbons

The second of poisons used by growers are the chlorinated hydrocarbons. They are the same family of poisons as DDT. There are other poisons used in vineyards which act like DDT. There names are dieldrin, aldrin and endrin. Once these poisons are sprayed, they do not disappear for 10 years.

Poisons like DDT do not wash off the grapes. They cause cancer in mammals. See Medical World News, March 14, 1969.

The third kind of poisons are called nitrates. They are used as fertilizers in the vineyards.

The water supply in Delano is so contaminated due to such a high level of nitrates that children under six months of age cannot take in the water (order of Delano City Manager).

THERE ARE NO INSPECTION PROCEDURES AND NO SAFEGUARDS TO PROTECT CONSUMERS FORM DANGEROUS PESTICIDE RESIDUES REMAINING ON GRAPES

FARM WORKERS MUST HAVE A UNION TO PROTECT THEMSELVES, THEIR FAMILIES AND CONSUMERS

RICH, CORPORATE GROWERS HAVE TO BE FORCED TO STOP THEIR RECKLESS DISREGARD OF THE EFFECTS OF POISONS ON HUMAN LIFE AND THEIR ENVIRONMENT NOW

FOR FURTHER INFORMATION: Peggy McGivern R.N.
Boycott Rep., UFWOC-Delano 936-0137

FOR YOUR INFORMATION

A.H. CAPLAN & ASSOCIATES
11651 Montecito Road
Los Alamitos,California 90720
(213) 431-0869

PRESS RELEASE--August 6, 1969-Al Caplan, Labor Relations Consultant and Spokesman for the TABLE GRAPE GROWERS NEGOTIATING COMMITTEE, Los Angeles Hilton Hotel, Los Angeles, California

The "Rule or Ruin' policy of the United Farm Workers Organizing Committee continues.

In conjunction with their bad faith bargaining, the Union is using the U.S. Senate hearings as a springboard to deliberately mislead and attempt to scare the American people by its 'holier than thou' attitude regarding the use of pesticides.

The purpose of the Union's allegations regarding pest control is to unconditionally force the table grape growers into their union. The proof of this is in the following offer made by the Union in writing on July 3rd, 1969 through the director of Federal Mediation and Conciliation Service, Mr. Edwin J. Scott, and we quote:

> "That we are prepared to give a moratorium to the whole industry on the pesticide campaign for a limited time in exchange for an acceptable contract covering all workers, all crops."

As we said to the American people last July 15th . . . "you, the American public, whether you be a consumer or a seller in the market place, are entitled to the truth." On June 30th, 1969, at 12:55 a.m., in the presence of the Union Committee, four growers and their spokesman and the three representatives of the Federal Mediation and Conciliation Service, the Union said, through their

(more)

spokesman, that the Union had been preparing a pesticide program for two years and this weapon was to be used only as a last resort for bargaining and organization purposes.

The Union has recently issued statements to the effect that the pesticide program was what broke off negotiations. THIS IS NOT TRUE. This is only to camouflage their bad faith bargaining technique. Negotiations broke down simply because the Union withdrew its agreed upon proposals and escalated their demands.

We have stated to the Union and we repeat to everyone--we growers have and will continue to abide by all Federal, State, County and Municipal regulations regarding the use of pesticides. We welcome any bonafide and sincere safeguards.

OUR GRAPES ARE CLEAN and can be eaten without danger to anyone.

Certain pest controls are necessary. Without them, food crops would be destroyed. Not only would this affect the farmer and the grower, but would affect products of agriculture necessary to feed an every increasing population.

TABLE GRAPE GROWERS NEGOTIATING COMMITTEE

BIANCO FRUIT CORPORATION, Delano, Arvin & Thermal, Calif.
S.A. CAMP FARMS CO., Shafter, California
CENTENNIAL VALLEY FARMS, Phoenix, Arizona
BRUNO DISPOTO COMPANY, Delano, California
H & M CO., Thermal, California
KARAHADIAN RANCHES, INC., Thermal, California
EL RANCHO FARMS, Arvin, California
JOHN J. KOVACEVICH, Arvin, California
MEL-PAK RANCH, Thermal, California
WILLIAM MOSESIAN CORP., Bakersfield, California
EUGENE NALBANDIAN, INC., Lamont, California

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PREPARED STATEMENT OF HON. JOHN V. TUNNEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

At least 1000 farmworkers in California were injured by pesticides last year. This has been going on for years. In 1964 for example, there were over 1300 reports of injury blamed on pesticides. The true figures may be even higher, taking into account an assumption of unreported injuries and illnesses.

When a farmworker tried to find out from the county agricultural commissioner in Riverside, a part of my district, just what pesticides were being used, he was given the cold shoulder. These facts according to long tradition were trade secrets, he was told, and could not be released. He had to go to court to try and obtain disclosure of the information. The state attorney general's office joined in the suit, and the action is still pending. Trial was held last month, and the result is expected soon.

It seems incredible to me that a member of the public, whose health is possibly endangered by the use of various chemical poisons, has no right to know what kinds of pesticides are being used and in what quantities. The California attorney general's office puts the problem very well in pointing out that the fish and game department can inspect this information when there is a fish kill; human beings are simply asking for the same advantage as striped bass, but before they are injured.

Fortunately the California legislature recently responded to the unfairness of this situation, and passed a bill which requires that companies report all sales of pesticides classified as injurious materials. There are some 30 of these, including 10 very toxic phosphates and 6 chlorinated organic chemicals, among them DDT.

In addition, the county agricultural commissioners must report the quantities of these pesticides which they permit to be used. Pesticide users must give statements of amounts which they use in their fields. All this data will be public. This is certainly a necessary first step in creating an open atmosphere where experts can begin to study whether pesticides are being applied appropriately.

The strong implication is that they are not.

I am appalled by the situation which is developing in California, where in most cases pest advisers are nothing but salesmen for the chemical companies, without extensive ecological training or understanding or environmental problems. Application of chemical poisons has been likened, by one scientist, to drug usage: the more you use, the more you find you need. Insecticides can kill off necessary predators which would otherwise help to control the harmful insect population. In this way the chemical companies rub out a competitor who might otherwise horn in on their business of killing insects. If there is a resurgence of the harmful pest, or a secondary outbreak, or if the pest develops resistance to the insecticide initially used, the answer is to apply more of the same poison or more of a combination of poisons. Clearly what is harmful to the farmer is helpful to the chemical manufacturer. The more outbreaks of pests there are, the more poison has to be used. Heavy repeated doses of expensive chemicals are not in the interest of the farmer and are destructive to the environment—to the detriment of man—most directly the farmworker—and to nature.

It is so much easier to develop a broad spectrum poison that will kill everything in site, including useful predators and wildlife, than it is to develop specific pesticides which are safe for man and wildlife, and which do not kill useful as well as harmful insects.

Such selective pesticides would be expensive to develop, and when developed, would have less of a wide market. It does not seem to matter that such pesticides would be far more economical for the farmer in the long run. The farmers remain lulled into accepting the nostrums of the pest advisers—more and more chemical poison.

I am informed by a California entomologist, with over 20 years experience with insecticides, that because the phosphate poison, azodrin, was so lethal to insects, it won overnight acceptance, even though the agricultural extension service had recommended against its use. This material was applied in great quantities to over 1 million acres, not all of which were infested. Although this chemical is not long-loved as DDT is, it caused widespread destruction of wildlife, because of its undifferentiated toxicity.

The very preventive use of this hard insecticide, many scientists feel had

an opposite effect from that intended, by killing off predators of later appear-pests, requiring the application of even greater quantities later on, compounding the environmental contamination.

A new requirement passed by the California legislature produces a glimmer of hope. County agricultural commissioners, under this law, must consider environmental effects in granting permits for pesticide use. The same holds true for the registration of new pesticides by the state department of agriculture. The meaning of this is clear to me, and my impression eachoes that of a person holding an important position in the California department of agriculture—it means that if the pesticide has harmful effects on fish and wildlife, it better not be used.

In the San Joaquin Valley alone, 1⅓ million pounds of DDT are still used on about 725,000 acres of crops. This is so although total domestic use dropped by about 50% between 1958–59 and 1966–67, representing a decrease of 39 million pounds. It is most heartening to see that it will decrease even further when the expected California ban on its use for 35 farm crops and 12 farm seed crops goes into effect. We must go further than this. Justifications for continued use on remaining crops should be clearly stated. Alternative controls should be carefully explored.

Environmental considerations call for a complete ban on DDT. The California law—requiring consideration of environmental effects of insecticide use—should be given strict construction.

DDT does not dissolve in water and it breaks down very slowly in the environment. Each year more is aded than disintegrates, and we are therefore accumulating a stockpile of this poison. The poison passes up the food chain, where it again accumulates in the tissue of fish, wildlife and in man.

Bit by bit evidence is coming in which underlines the disastrous effects which DDT could have on our whole environment. Most disturbing is an experiment which indicates that small quantities of the poison interfere with the oxygen producing ability of marine plankton, a small single-celled algae which helps to replenish the earth's supply of air. Equally disturbing is the confiscation by government authorities of coho salmon from Lake Michigan, and the confiscation of Jack Mackerel caught in the Pacific off southern California, because of excessive DDT content. Recently a million young salmon were killed in Lake Michigan because, it is believed, of the presence of DDT in the water. DDT is everywhere. It has penetrated all our oceans, and to the polar icecaps.

The effects of this pollutant on our water resources is critical, because of the hope that we can harvest food from this source to meet the nutrition needs of an exploding population. It is one thing for pesticide supporters to scoff at those who assert the threat to wildlife. I react to their insensitivity with disbelief and alarm. The approaching extinction of the bald eagle, the falcon, the brown pelican, and other wildlife, due to their inability to lay viable eggs, is a terrible thing, and it strongly implies that the effects on man's own physiology may not be so benign either. Still the insensitivity of these scoffers nowhere nearly matches their opaqueness when they argue for the use of chemical poisons to boost world food production, when the use of those same poisons threatens to destroy and contaminate tons of equally imprtant nutriment from the seas. The demise of the Dungeness crab, formerly a bay area delicacy, is a case in point.

Laboratory tests have shown that large doses of 11 pesticides including DDT and three other persistent insecticides produce a high incidence of tumors in mice. We can all remember the part mice have placed in our experiments with the effects of cigarette smoking. The difference is that we can give up cigarettes, although many of us cannot give up breathing the polluted air of our cities, which amounts to smoking two packs of cigaretts a day. Where DDT and other persistent pesticides are concerned, we absorb these poisons into our system now whether we like it or not, and whether we choose to do so or not. I believe that all of us have a right to an environment which does not endanger our well being. Intensified studies of the effects of DDT and other insecticides are urgently needed. In the meantime, the indiscriminate use of these poisons must be halted. The development of more selective chemical poisons, and the use of alternative methods of control actually promise surer, cheaper control of certain pests. For example, biological controls are being developed which raise the hope of controlling insect populations through the release of hundreds of thousands of sterilized males. The males are released

over an infested field, where they mate with females. Since the eggs are never fertilized the insect population does not perpetuate itself. Since the sterilized males flood the site of the infestation, the odds are that few new insects will be produced by the limited number of virile male insects already in the area.

Experiments of this kind sponsored by the United States Department of Agriculture, are now going on in parts of Kern county, and in the Coachella Valley, which is part of my district. These experiments involve a cotton pest, the pink bollworm. There are problems of breeding a sufficient number of sterilized insects, but there is every expectation that this control method will prove effective. The result will be greatly reduced dependence on chemical poisons to kill insect pests.

Even more exciting to me are various forms of non-toxic sprays consisting of hormones which are specific for a single variety of insect. These so-called third-generation pesticides arrest the development of a whole species of harmful pest so that they do not reproduce. At least one company has begun commercial development of such a pesticide.

I am planning to introduce legislation which will significantly increase the amounts of federal money available for research and curriculum planning in the field of pest control. I believe that this kind of support will develop non-toxic methods of pest control, using highly specialized chemical poisons as a last resort.

We must undoubtedly face the fact that the chemical companies are not going to enthusiastically develop cleaner pesticides, or alternative controls any more than the automobile industry is going to energetically develop a pollution free vehicle. Both may talk about the need for improvement of their product. But when it comes to protection of the environment, government incentives are going to be necessary. We are going to need Federal funding as well as legislation and strict regulation, if we expect our environment to remain a suitable place for us to live and work, without great danger to our health.

The time has come for the quality of our environment and the health needs of our people to be given the same importance and recognition as the annual growth in our gross national product. In fact, it might be more accurate to begin speaking of a new kind of national product. Measured against the gross national product would be the costs on the other side of the balance sheet—the foremost of which is reflected in the pollution and destruction loosed upon our environment in creating what is hailed as unparalleled material success. That pollution has now become a burden and a concern to the vast majority of us, while the illusory gains of an ever-expanding, but misdirected gross national product contribute less and less to improving our quality of life.

Senator MONDALE. At this point in the hearing record, I order printed statements of those who could not attend and other pertinent material relating to the problem of farmworker exposure to pesticides.

(The material referred to follows:)

UNITED FARM WORKERS,
ORGANIZING COMMITTEE AFL–CIO,
Delano, Calif., October 21, 1969.

SENATOR WALTER S. MONDALE,
Old Senate Office Building,
Washington, D.C.

DEAR SENATOR MONDALE: I have read with interest the statement of John Giumarra, Jr. which was submitted to the Senate Subcommittee on Migratory Labor on September 30th, 1969.

On Page 3 Mr. Giumarra states that the Food & Drug Administration has totally cleared the California table grape crop from charges that it is contaminated by Aldrin or in any way whatsoever by pesticides. I would like to point out to the committee that Safeway's own tests found Aldrin on the grape and the test which Senator Murphy introduced into the Congressional Record on August 12th found residues of Aldrin on Bianco grape. Furthermore, the survey which Senator Murphy submitted on August 12th conducted by the F.D.A. reveals that many grape growers have residues of DDT on their crops. We fail to understand Mr. Giumarra's claim that the industry has been cleared. We think that Murphy's own F.D.A. survey is a damning indictment

of the practices of the table grape growers in their use of pesticides. There is much evidence which has recently been brought to light which indicates that DDT and other related chlorinated hydrocarbons currently used by the California table grape industry are causing cancer in mammals and that there is a relationship between certain diseases such carcinoma, leukemia, arteriosclerosis and high levels of DDT in the body fat of humans. A recent petition filed before the F.D.A. has asked that the tolerance of DDT be lowered from 7 to 0. It would seem that grapes containing any residues of DDT should be banned from the market, especially in light of Secretary Finch's recent action in banning cyclamate. Secretary of Health, Education & Welfare, Robert Finch stated that "it is imperative to follow a prudent course in all matters concerning public health." This Finch test as applied to cyclamate meant that once cyclamate was proven to cause tumors in rats it was removed from the market. Following this principle as articulated by Mr. Finch, it would seem that since DDT and its related chlorinated hydrocarbons also cause cancer in mammals and that since it has been proven by Senator Murphy that DDT and its related chlorinated hydrocarbons are widely used in the grape industry (See Page S 9865-S 9869 of the August 12th Congressional Record) that any grapes containing residues of DDT should immediately be taken off the market. Furthermore, it is of course clear that DDT and other related chlorinated hydrocarbons which cause cancer should be immediately banned by Secretary Finch.

Mr. Giumarra discusses at length conversations which I had with him and with Mrs. Eleanor Schulte of the South Central Farmers Committee. I did tell Mr. Giumarra and Mrs. Schulte that if the grape industry did not sit down and resolve the pesticide problem through the collective bargaining process that we would have to take our case to the public. Mr. Chavez was hesitant in using the pesticide issue because he thought that as long as there was any chance of resolving this issue at the bargaining table it should be pursued in that matter. It was only after the table grape industry refused to sit down and discuss this issue with us and only after negotiations with 12 grape growers broke up over the use of economic poisons that we had no alternative but to take our case to the public. The table grape industry has refused to sign a health and safety clause similar to the one which we have just negotiated with Perelli-Minetti and which is on file before your committee. This clause protects the workers and it bans DDT, Aldrin, Endrin and Dieldrin. Perelli-Minetti can live with this clause and we believe that the table grape industry can live with this clause.

Mr. Giumarra implied that we used the economic poison issue as a "throw away issue." The fact that we have recently included this in our Perelli-Minetti contract after many months of negotiations indicates that this is a false charge. Giumarra quotes a proposal which was submitted to the whole industry which would have given them a moratorium on the pesticide campaign for a limited time in exchange for an acceptable contract covering all workers, all crops. This proposal accurately reflects our position during the negotiations. An acceptable contract would have been a major step in solving the pesticide problem as it relates to workers and consumers because it would have included a Health and Safety Clause similar to that recently negotiated with Perelli-Minetti which provides: (1) access to information currently withheld by the state, (2) the formation of a Health and Safety Committee to determine with the aid of experts when the fields become safe for crew to work in after the application of economic poisons, (3) a total ban on DDT, Aldrin, Endrin and Dieldrin and other dangerous chlorinated hydrocarbons, (4) a requirement that the employer provide adequate protective equipment, (5) a requirement that the employer provide adequate sanitation facilities, such as toilets and handwashing facilities, (6) cholinesterase tests provided at the expense of the employer and other protections.

Mr. Giumarra accuses the union of lying to the American people by distributing handbills which charge the growers with using pesticides of a kind "developed by the Nazis during World War II," and "which work just like war gases in its effect on human beings." This is not a distortion, this is the truth. Grape growers are currently using the organo phosphate poisons, parathion, and pesticides related to it operate on the human system in a matter similar to the nerve gases which were developed in Germany before and during World War II.

As the letter from Dr. Mizrahi which had been submitted to this committee

indicates, farmworker children are suffering from an epidemic of pesticide poisoning which involves not only high DDT levels in their blood plasma but low cholinesterase levels. During the court hearing which held in January in an attempt to obtain records concerning the use of economic poisons by commercial applicators, Dr. Thomas Milby of the California Department of Public Health testified that only two substances inhibit and lower cholinesterase levels in human beings. Those substances are war gases and pesticides.

Finally, Mr. Giumarra in his oral presentation stated that his insurance rates had risen because of repeated arsons in the table grape area. He implies that the UFWOC is connected with these arsons. I am enclosing an article from the Fresno Bee of Tuesday, September 23rd, which indicated that state investigators found no evidence of UFWOC arson. Subsequently to that time, arrests have been made and the sheriff of Tulare County indicates that there is no connection between the fires and our union.

Yours truly,

JEROME COHEN, *General Counsel.*

STATE PROBERS FIND NO EVIDENCE OF UFWOC ARSON

[From the Fresno Bee, Sept. 23, 1969]

(By Ron Taylor)

Delano—State fire investigators say there is no evidence to support politicians' statements that indirectly link incendiary packing house fires to the Delano grape strike and Cesar Chavez' United Farm Workers Organizing Committee.

There have been three packing house arson fires in the Tulane-Kern Counties strike area this month; two of them were set on the same night. The California Division of Forestry (CDF) reported the total three fire loss at $364,000.

CDF records show Tulare County has had 180 incendiary fires this year, causing $1.3 million damage. Twenty of these fires were set in the grape strike area. There have been packing house arson fires in Strathmore ($1 million) and in Woodlake ($56,000).

There have been two other packing house fires in the City of Delano. One was a reported arson, the other was started by unknown causes. Total damage was estimated $70,000.

Last week Michigan State Sen. Lorraine Beebe called a San Francisco press conference to announce she had been to Delano and found: "A pattern of fires, fire bombings and threats has developed in the vineyards . . ."

A press release of her statements, prepared by Whitaker Baxter, the grape growers' public relations firm, quoted the woman senator as she quoted CDF fire investigator Euel Goldsmith on the Tulare County arson figures.

W and B said Sen. Beebe reported Goldsmith said Tulare County "had less than 100" set fires in the grape-growing areas of the county in 1964-65. According to W and B and Sen. Beebe, Goldsmith's figures indicated this figure has "increased to between 200 and 400 set fires a year" since the start of the grape strike.

From his Visalia office, Goldsmith said the press release statistics were a distortion of figures he supplied at the public relation firm's request.

"In the first place I was talking about the entire county, not just the grape strike area," Goldsmith said.

Goldsmith said he gave only approximations, and said the countywide 1964–65 incendiary fire rate was "between 100 and 200 fires a year." He said this has gone up to between 200 and 400, countywide.

A check of county fire records shows arson has gone up. But the highest figure reported was 256 incendiary fires, out of 1,975 calls for 1967. In 1965 the rate was 172 arson fires in 1,253 fire calls. The 1968 figure was 181 incendiary fires out of 1,505 fire calls.

The day after Sen. Beebe's press conference, State Assemblyman William Ketchum of Paso Robles asked the state attorney general's office to aid the CDF in its arson investigations.

Goldsmith, and his boss, Ray Banks, the CDF officer in charge of the Tulare County operations, said they then began to get questioning calls from various

state legislative and administrative offices, including the office of State Sen. Howard Way.

Goldsmith has prepared a map of arson-caused fires in the grape strike area since the first of the year. It shows 20 locations—including the packing house fires—the dates the fires were set and the estimate of damage.

Other than the packing house fires the incendiary fires were set in piles of boxes, farm tractors, irrigation pumps and in pickup trucks. In Kern County Fire Chief Robert Williams reported such fires have been on a steady increase of 5 percent a year for the last five years, but, he said, none is directly related to the strike as far as he is concerned.

These incendiary fires in Tulare County make up less than 10 percent of the total set in the county. However, in dollar value they constitute about 25 percent of the fire losses.

Combine this total with the $1 million Euclid Citrus Packing house fire in Strathmore and it makes most of the total arson loss for the year. A Euclid official said he could find no connection between the citrus house fire and any of the other packing house fires.

Banks said. "We are asking ourselves, 'Why the packing house industry?' They are a big, significant part of our agriculture economy and we're seeing more packing house fires this year than we have had, in total, for several years. Why?"

Banks explained the CDF job is to investigate these crimes and to gather evidence. Although he did not say so, it was obvious the politicians' statements were disconcerting because they invoked emotion and confusion.

He said when investigators have enough evidence to make a case, they will ask for warrants and arrest the guilty party and until that time they would not make accusations or imply guilt in any direction.

Mrs. Beebe in her press release circulated by Whitaker and Baxter, avoided definitely linking UFWOC with the fires. Three sentences, however, read as follows:

(1) "The anti-solution forces of the United Farm Workers Organizing Committee have done everything they can do to prevent peace . . .

(2)—"The only reason Chavez would stoop so low (bring the pesticide issue into the boycott) would be to further his determination to rule or ruin the grape industry . . .

(3) "There weren't fires at harvest time until ambitious elements began their rule or destroy maneuvers." She concluded, "These people don't want peace, except on their own terms."

Goldsmith, after noting there were distortions of his county-wide figures, said he, Banks and other CDF officials are concerned about an increase in arson. He said arson in the grape strike area is only a part of the total picture.

Banks added, "all over the country we are going through the same patterns of increased arson as Los Angeles and other places in the state. We are very concerned about this. Arson is a crime that is just as bad as theft. If someone committed a $1-million robbery, that would be big news, but the public seems apathetic to a $1 million arson fire."

Goldsmith pointed out, "We look at who the victims are, try to establish patterns. In this case, the fires in the grape strike areas seem to be set to destroy grower property. In my mind they are related, somehow."

What are the patterns? So far the only common links are use of inflammable petroleum products to ignite the fire and the fact that on two nights, the firebugs set two fires within a few miles and a few hours of each other.

On Sept. 2, at 3:38 a.m. a fire was reported in the Elmco Cold Storage Plant's box shed, northwest of Ducor. This fire caused an estimated $104,000 damage to boxes, machinery and farm equipment.

At 4:50 a.m. the same day, arsonists set the Dispoto Packing House on fire in Delano, causing $200,000 damage. Five nights later the second set of fires was touched off, one in a forklift truck in a vineyard, near Richgrove; the other, in a farm labor barracks in Richgrove. Neither caused great damage.

The barracks belonged to a labor contractor who reported three other incendiary fires on his property in the past two months.

The district attorney's office and sheriff's department have been aiding the CDF in the investigations. In addition, the state sent down additional arson investigators.

Following Sen. Beebe's statements, the Delano grape growers put up a $5,000

reward for the capture and conviction of the package house arsonists and announced a 24-hour guard was being placed around their buildings.

A spokesman for the Tulare County district attorney's office commented, "Things are getting pretty touchy down there."

[The Bakersfield Californian, Sept. 30, 1969]

SEN. MURPHY RETRACTS PESTICIDE CHARGES

WASHINGTON (UPI)—Sen. George Murphy, R-Calif., today retracted charges that a California union had falsified a sample of table grapes to show a dangerous level of pesticide residues.

"Let's say that I was mistaken," he said during a Senate hearing called at his request to consider conflicting laboratory reports on pesticide residues in California table grapes.

Murphy's retraction and near apology came during an exchange with Sen. Walter F. Mondale, D-Minn., chairman of the Senate Migratory Labor Subcommittee.

Murphy denied he had accused the United Farm Workers Organizing Committee (UFWOC) of misleading the committee with "a vicious type of deceit" in its efforts to organize California grape workers.

Mondale said he did not believe UFWOC had doctored a sample of grapes purchased from a Washington area store and found by an independent laboratory to contain a dangerous level of the pesticide aldrin.

"I think it is abundantly clear the union took an honest sample, took it to an honest laboratory, and came up with an honest report," Mondale said.

As a result, Mondale said, he felt the committee was "kicking a dead horse."

The chairman's comment resulted in prompt disagreement by Murphy, who said the committee should seek to determine the facts about a report that had done "a great deal of harm" to industry. He said he wanted to know how the pesticide got into the sample in light of testimony that aldrin was not used on California grapes.

"This is not just an accusation," he said.

Mondale said Murphy's comments suggested "the nature of this hearing has changed," but went on a few minutes later to cite Murphy's charges of "a vicious type of deceit" by UFWOC.

"I did not understand that my statement was on trial here, and I resent the implication," Murphy said. "I have made no charges against anyone."

Mondale then read another of Murphy's statements suggesting UFWOC's charges grapes had dangerous amounts of pesticide were "part of an attempt to mislead the subcommittee by presenting false testimony."

When Murphy asked where Mondale was reading from, the chairman said it was from the Californian's letter requesting the hearing.

"This is a personal letter from me to the chairman, isn't it?" Murphy said.

"It was released to the press," Mondale noted, adding it made a "serious charge."

"Let's say that I was mistaken," Murphy said. "I intended no accusation. I'm not in the habit of accusing without facts and knowledge. Let's get on with the hearing. If the chairman has any complaints about me, I think we should take them up at a different time."

"Yes, I'm very fond of Senator Murphy," Mondale said. "I have no complaints."

Sen. Alan Cranston, D-Calif., sat silently throughout the exchange.

Expert testimony presented to the committee did little to solve the mystery of how the aldrin got into samples which both UFWOC and Safeway Stores had tested by independent laboratories. Tests by the Food and Drug Administration, on the other hand, showed only traces of aldrin.

Dr. Paul E. Porter, a chemist for a Shell Development Co. Research Laboratory at Modesto, said—as did grape growers—he knew of no use of aldrin on grapes for at least three years. To have produced the large amount of residue found in UFWOC's sample, he said, would have required "a ridiculous rate of application on the grape crops."

Porter also suggested sulphur, which is used for mildew and mite control on grapes, might have been mistaken for Aldrin in the tests.

Anthony A. Bianco Jr., a Fresno grape grower conceded during questioning by Mondale it was possible the conflicting reports on pesticide residues were

"an honest difference of opinion" rather than a deliberate attempt to deceive. However, in opening his testimony, Bianco charged the "Aldrin scare is no more than another effort to whip me into submission." He said he was one of a dozen growers who tried unsuccessfully to negotiate a labor contract with UFWOC.

[From the Fresno Bee, Oct. 1, 1969]

GRAPE-DOCTORING CHARGE IS DISCLAIMED BY MURPHY

By Michael Green

WASHINGTON—Senator George Murphy, R-Calif., has backed down from charges he had made suggesting the United Farm Workers Organizing Committee may have doctored California table grapes found by a laboratory to contain the dangerous pesticide Aldrin.

In a heated exchange with Sen. Walter F. Mondale, D-Minn., chairman of the Senate migratory labor subcommittee studying the charges, Murphy disclaimed ever having made them in the first place.

"I haven't charged anyone with deceit to my knowledge," Murphy said. "I meant no charge against anyone. I think that's fairly clear."

Pressed by Mondale, Murphy acknowledge that he "may have to apologize" if statements he made appeared to accuse the UFWOC of doctoring grape samples. But he said he still "wondered" how an independent Washington laboratory found California grapes to contain Aldrin 180 times the level of tolerance when the grower Bianco Fruit Corp., of Delano, Arvin and Thermal, denied buying or using Aldrin the past six years.

"It brings me back to my original questions," he said "Who put the overalls in Mrs. Murphy's chowder? Who put the Aldrin on the grapes?"

Testimony in two days of hearings from several chemists, officials of the Food and Drug Administration and the head of the laboratory that ran the grape tests indicated that the lab may have mistakenly identified a harmless quantity of ordinary sulfur as being Aldrin.

Both the lab, C. W. England of Washington, and a second laboratory in Baltimore found Aldrin present on grapes taken to them for testing by both the UFWOC and later by Safeway Stores, Inc., where the original tested grapes were purchased.

An expert in pesticide testing told the subcommittee today that because of sophisticated testing procedures and the tendency of Aldrin to break down chemically within a short time, the likeliest explanation for the lab results was an error in testing procedures.

Murphy said after the expert's testimony, however, that he still hadn't "heard any testimony yet as to how there got to be 18 parts per million of Aldrin on those grapes. This is not, of course, an accusation."

"Well, some might take it as such," Mondale interrupted. He quoted Murphy as saying the farm workers had engaged in a "vicious type of deceit" when they submitted the lab report to the subcommittee in testimony last month.

"There might be someone who would take offense at that," Mondale said wryly.

"Where did I say that?" Murphy asked.

Mondale cited the letter Murphy wrote requesting hearings on his charges. Murphy suggested in the letter the possibility "that a subcommittee of the U.S. Senate has been the victim of duplicity.

"If this be the case," the statement continued, "this tactic on the part of the United Farm Workers Committee is a vicious type of deceit . . ."

"I may have to apologize," Murphy said. "I didn't mean it that way . . . the chairman knows that."

As the exchange grew more heated, Murphy implied Mondale violated senatorial courtesy by mentioning the letter. "This is a personal letter from me to the chairman of the committee. Is that right?"

RELEASED TO PRESS

"And it was released to the press," Mondale observed.

"I didn't release it," Murphy said.

The text of the statement, however, appeared in a speech made by Murphy on the Senate floor Aug. 12 and printed in the Congressional Record.

Growing red with anger, Murphy insisted, "I'm not making accusations

. . . I'm not in the habit of accusing without facts and knowledge. I've been around some time now. If the chairman has any complaints I think we should take it up at a different time."

Mondale smiled. "I'm very fond of Sen. Murphy."

"Thank you!" Murphy snapped.

[From the Los Angeles Times, Oct. 1, 1969]

MURPHY RETRACTS ACCUSATIONS AGAINST UNION ON PESTICIDES

By Thomas J. Foley

WASHINGTON—Sen. George Murphy (R-Calif.) backed off Tuesday from earlier accusations that Cesar Chavez and his United Farm Workers Organizing Committee (UFWOC) had attempted to mislead a Senate subcommittee on the presence of pesticide on California grapes.

The setting was a labor subcommittee's hearing into circumstances surrounding UFWOC's charge Aug. 1 that California grape growers had applied excessive amounts of a pesticide to their product.

The farm workers cited a laboratory analysis which showed that grapes were coated with a pesticide called aldrin 180 times above human tolerance levels.

It was in an exchange with the committee chairman, Sen. Walter F. Mondale (D-Minn.), that Murphy offered his near apology to the farm workers union. Mondale said the committee had been "kicking a dead horse."

MURPHY STATES VIEW

"I think it is abundantly clear the union took an honest sample, took it to an honest laboratory and came up with an honest report," Mondale said, conceding that the report might be wrong.

Murphy promptly disputed that it is a "dead horse," declaring "playing games with California table grapes has done enormous harm to the industry, and to the workers."

If testimony shows aldrin is on grapes in Washington after not having been used in vinyards in California in three years, "it's extremely important." Murphy added, "This is not, of course, an accusation."

Mondale said this seemed to change the nature of the hearings and cited Murphy's statement last month that UFWOC's tactics were "a vicious type of deceit."

Murphy said, "I did not understand that my statement was on trial here, and I resent the implication. I have made no charges against anyone."

"There might be some who would take offense," Mondale said wryly, as farm workers supporters in the room laughed.

He went on to quote Murphy again as having said UFWOC's charges that grapes had dangerous amounts of pesticides were "part of an attempt to mislead the subcommittee by presenting false testimony." He said "I find that a very serious charge."

"This is a personal letter from me to the chairman, isn't it?" Murphy asked.

"It was released to the press," Mondale replied.

"In any event, let's say that I was mistaken," Murphy said. "I've been around for some time, and I'm not in the habit of accusing without facts and knowledge. Let's get on with the hearing. If the chairman has any complaints about me, I think we should take them up at a different time."

"I'm very found of Sen. Murphy," Mondale said "I have no complaints."

Tuesday's session was given over to the growers' side of the story, and if Murphy shied away from attacks on UFWOC, John G. Giumarra Jr., of Edison, Calif., did not.

Giumarra, general counsel of the Giumarra Vineyards Corp., made a point-by-point refutation of nearly every charge made by Chavez and UFWOC counsel Jerome Cohen. He concluded by calling the union's Aug. 1 charge "an irresponsible and deceitful act."

Giumarra cited expert witnesses who said lab analyses of pesticides are difficult to interpret, that aldrin's characteristics are almost identical to sulphur, and that aldrin is not used as a pesticide in California vineyards.

Either the grapes purchased in the Washington supermarket by UFWOC were "doctored," Giumarra said, or the lab analyses were wrong.

SALUD-WOODVILLE,
Woodville, Calif., September 24, 1969.

DR. LOWELL CHAMBERLAIN,
Health Officer,
Tulare County Health Department,
Visalia, Calif.

DEAR DR. CHAMBERLAIN: This summer part of the Salud staff has been involved in a survey to assess the nutritional status of our patient population. As you know, most of our patients are low-income farm worker families; a random sample of those who used the clinic during the summer were selected for the survey.

As part of the hemotological data collected by our team, blood levels of pesticide residue and serum and red blood cell cholinesterase activity have been determined by the State Department of Public Health laboratories.

The results are not yet complete for all the parameters measured in the survey. But based on the findings which we have received, we have been surprised to find the nutritional status is above what we had anticipated. But the pesticide levels reported on our children can only be classified as an epidemic.

Of the 29 children for whom we have received results, 41% (12) show cholinesterase levels depressed below the lower limit of the range suggested by Nabb and Whitfield, 1967, 3.6 mMole/min/ml. for plasma.

Of the 12 children for whom we have received DDT level determinations, 42% (5) show a higher level of pesticide residue than the highest limit of the normal range suggested by Edmunson et al, 1969.

Of the 12 children for whom we have received DDE level values, 75% (9) show a higher residue level than Edmunson's highest limit of normal range. The mean value for our children are more than 3½ times as high as the mean value Edmunson reports.

I had not taken the pesticide problem very seriously until recently myself. Much like the union controversy, it seemed to me that there were those who believed there was a problem and those who did not. I had personally felt that it was hard to say, one way or the other. But now I am convinced that there is a serious problem, that it must lead to an action and research program in this area, and that I would like to be involved in it.

I believe first that these preliminary findings demand that we study a much larger population over a longer period of time. The state was anxious to analyze samples for our survey because routine screening for pesticide levels had never been done on rural children in this state before. This also means that the "normal range" values which we are using to evaluate our findings are those of adults. We are not at all sure that the tolerance levels should be as high for children as they are for adults. We do not know whether values for rural children are the same as those for urban children, and we have no data on farm workers children from other states where similar pesticides are used with which to compare our findings. Considering the great amount of money that goes to investigate the effect of different pesticides on crops, I feel that it should be possible to get some monies to find out how different pesticides affect children.

Second, I feel that we should call the pesticide problem a public health problem. Public health departments are quick and efficient in working on other types of epidemics—such as the dangers posed by the floods in our county this past winter. They provide free service to people in ruling out communicable disease, and they co-operate well with the private physician. I do not believe any longer that the pesticide problem is limited to a concern between employer and employee, because many of the children we tested were not part of the labor force. I feel that we physicians should help ensure that public health receives enough funds and staff to fulfill this responsibility. I feel funds should be available to allow all rural citizens of our state to have routine pesticide testing in 1970. Perhaps Migrant Health Act monies should be tapped for this purpose. While we very much appreciate the relationship we have had with the state laboratory this summer, we realize that they are not staffed or funded to accept routine specimens from all the concerned physicians and farm workers in this state. So, we feel that their grants for expanded research and routine monies for periodic testing of rural people should be forthcoming.

Third, I feel that research should be encouraged to find out what abnormal pesticide levels mean to those afflicted. At present, there is emotional speculation on both sides, but very little fact. In most cases, I feel competent to interpret an abnormal lab test and to initiate therapy. But in the case of a low cholinesterase or a high DDT level, I have no answer for my patients. Do I tell small children to stay away from their parents after they have just come from work?

Do I tell teenagers from large, poor families to stop working, lest they develop clinical symptoms of chemical poisoning?

Do I tell families in grower-provided housing to move off the ranches because they are too often sprayed by passing planes and tractors?

Do I tell my young patients not to accept the fruits that their parents bring home to them?

Are all of these things, together enough? Or should I be lobbying against the use of pesticides which I am told are essential to the agriculture of our state and to the jobs of our patients?

I would appreciate your views on this problem and would like to help you in any way that I can. For your information, I am enclosing a table which summarizes the results we have received thus far on our children, along with interpretative materials supplied by the state. My patients, their parents, and I are becoming increasingly alarmed over the pesticide problem. I realize that this issue is controversial and emotional, but I would like to be on the side that is seeking answers now. I need help in this and would appreciate a chance to talk with you or others you might refer me to.

Sincerely,

LEE MIZRAHI, M.D.

LABORATORY DETERMINATIONS OF CHOLINESTERASE LEVELS AND SELECTED CHLORINATED HYDROCARBON PESTICIDE RESIDUES, 29 CHILDREN, RURAL, TULARE COUNTY, CALIF., AUGUST 1969.

Age	Ethnic	Cholinesterase activity		Chlorinated pesticides	
		plasma [1]	R.B.C. [2]	ppmDDT [3]	ppmDDE [4]
2	Anglo	4.28	[5] 10.95		
6	do	4.72	12.60		
12	do	[5] 3.52	13.75		
12	do	5.79	12.90		
13	do	5.64	13.05		
14	do	[5] 3.44	15.50		
14	do	4.52	13.80		
16	do	[5] 2.14	[5] 8.25		
4	Negro	[5] 3.25	[5] 10.45		
5	do	5.40	12.50		
14	do	[5] 3.02	[5] 10.95		
13	Puerto Rican	[5] 3.52	13,75		
15	do	[5] 3.09	12.25		
2	Mexican-American	[5] 3.41	11.80		
4	do	3.95	11.70		
5	do	4.30	[5] 10.15	[5] 0.021	[5] 0.034
8	do	[5] 3.40	12.40	[5] .032	[5] .053
8	do	4.53	14.80		
10	do	3.84	12.20	[5] .026	[5] .047
11	do	4.71	13.35	[5] .028	[5] .038
11	do	5.10	14.95	.006	[5] .022
12	do	4.63	15.15	.009	.015
12	do	4.44	13.20	[5] .022	[5] .047
12	do	3.71	11.45	.010	[5] .017
3	do	4.59	12.55	.002	.012
14	do	[5] 2.52	11.85	.012	[5] .028
14	do	[5] 3.59	12.30	.005	.010
15	do	5.00	11.70	.005	[5] .039
16	do	[5] 1.76	[5] 6.75		

[1] The range of values for the general adult population without known pesticide exposure was reported by Nabb and Whitfield (Archives of Environmental Health 15: 147, 1967) to be: Cholinesterase plasma: 3.6–6.8 uMoles/min/ml. (A low cholinesterase level is of concern.)

[2] Op. Cit. Cholinesterase Red Blood Cells: 11.1–16.0 uMoles/min/ml.

[3] Levels for nonoccupationally exposed males, as reported by Edmunson et al. (Public Health Reports 84, pp. 53–58, 1969) are: DDT mean: .007 p.p.m.; DDT range: .007–.012. (A high DDE or DDT level is of concern.)

[4] Op. Cit. DDE mean: .008 p.p.m.; DDE range: .003–.016 p.p.m.

[5] Indicated value is outside normal range in undesirable direction.

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY,
DEPARTMENT OF PUBLIC HEALTH,
Berkeley, August 22, 1969.

MRS. WENDY BROOKS,
Salud Clinic,
Woodville, Calif.

DEAR WENDY: Attached are the latest results of our laboratory determinations of cholinesterase levels and selected chlorinated hydrocarbon pesticide residues in blood samples submitted to the laboratory in accordance with the memorandum of July 9th from Mr. Thierry Brun to Dr. Margen, Messrs. Roth, Jones and myself.

Plasma and red cell cholinesterase levels were determined using the automated pH Stat method described by Nabb and Whitfield (Archives of Environmental Health 15: 147, 1967). The range of values for the general adult population without known pesticide exposure was reported by these authors to be as follows:

Cholinesterase, Plasma 3.6 to 6.8 uMoles/min/ml.

Cholinesterase, Red Blood Cell 11.1 to 16.0 uMoles/min/ml.

The blood was also analyzed for the presence of the following pesticide residues:

o,p' DDT p,p' DDT o,p' DDE p,p' DDE a,B & d BHC Methoxychlor Toxaphene p,p' DDD Lindane, Chlordane Heptachlor, Strobane, Thiodan, Kelthane, Heptachlor Exposide, Endrin, Dieldrin, Aldrin.

Using gas chromatographic analysis, residues of two different materials, pp DDT and its metabolite, pp DDE, were detected as indicated on the attachment.

For comparative purposes, Dale et al, (Life Science *5* 47, 1966), using a laboratory technique similar to the one we employ, determined the following levels in the general male population of the United States.

DDT—0.0068 ppm.

DDE—0.0114 ppm.

Again for comparison, Edmundson, et al (Public Health Reports *84* 53–58, 1969) report the following for non-occupationally exposed white and non-white males.

Race	Persons	Mean (p.p.m.)		Range (p.p.m.)	
		DDT	DDE	DDT	DDE
White	23	<.007>	.008	<.007–.012	.003–.016
Non-white	37	<.007>	.022	<.007–.015	.009–.098

The above levels were determined on whole blood and are expressed on a whole tissue basis. For comparative purposes the ppm units used above and r/ml used in the attachment may be considered to be the same.

Our laboratory experience had led us to conclude that the ranges cited above are applicable to the general population of California.

Sincerely yours,

DONALD C. MENGLE,
Research Specialist II, Community Studies on Pesticides.

PREPARED STATEMENT OF LEE MIZRAHI, M.D., WOODVILLE, CALIF.

Gentlemen: My name is Lee Mizrahi. I am a pediatrician who came from Los Angeles 8 months ago to practice medicine at Salud Woodville, a clinic located in southern Tulare County, which serves mainly low-income, farm labor families. We are the only medical facility in a 750 square mile area, where about 4000 farm worker families live in small towns, labor camps, and isolated ranch housing.

Because our clinic has evening and weekend hours, a Spanish speaking staff, reasonable prices, active social service workers as well as a public health nurse, the majority of seasonal farm worker families in the area have had contact with our clinic in the past two years.

In Los Angeles, I did not treat many children who worked. In Tulare County, many of the children I see go to the fields with their parents. Some work

beside them and others, smaller, play nearby or spend the day playing and sleeping in the family car parked on some ranch access road. This means to me that the occupational health and safety codes you are considering today for the industry of agriculture have great importance to the health, growth and development of the children as well as to their parents.

When I moved to Tulare County, I became aware of the growing controversy over pesticides but I considered it an emotional issue with little scientific basis, not to be taken very seriously. Then this summer our clinic conducted a nutrition survey of patient families and, as an afterthought, asked and obtained cooperation from the State Health Department laboratories to analyze the sampled children's blood for possible pesticide residues and effects. Among the pesticides studied was the group known as organic phosphates. Let me cite for you some salient points concerning organic phosphates, contained in my medical toxicology texts: Organic phosphate insecticides are among the most poisonous materials commonly used for pest control. In terms of toxic actions to man, they are related to one another and also to a group of chemical warfare agents known as the nerve gases . . . Absorption to a dangerous degree can occur through any portal including the intact skin. . . . Their action is to inhibit the enzyme cholinesterase in all parts of the body. Toxic signs and symptoms are regarded as an indirect consequence of this enzyme inactivation . . . clinical intoxication is possible from small repeated subclinical exposures . . . The situation is particularly hazardous because of the narrow margin between the dose which is just sufficient to produce symptoms and that which is adequate to kill." *Clinical Toxicology of Commercial Products*, Gleason, Gosselin, Hodge, Smith, p. 183. Williams and Wilkins, 3rd Edition, 1969.

Of the 58 children studied this summer, we found that 27 had abnormally low cholinesterase levels in either their plasma and/or red blood cells when compared to normal values which are established for adults.* However, when I began to ask scientists what these low laboratory values really meant to my patients, I was reminded that our clinic was the first in the United States to analyze rural children's blood in this manner. To me, it is tragically absurd that in 1969 such a study by an obscure rural doctor should be found to be the first one ever done on children. Were these findings an ominous sign of a serious public health problem of epidemic proportion or, perhaps, do children normally have lower cholinesterase levels and should science not be using these accepted adult norms? We all agreed that more research is urgently needed—and needed now.

When I pondered, as a practitioner, what to tell the children's families, this absence of reliable data on which to base conclusive diagnosis became intolerable. Most of the children were not clinically sick—but then many patients with early cancer do not feel sick and yet a positive Pap lab report tells me to take action immediately. Some of the children, like their parents, had been feeling sick. They may have had skin rashes or burning eyes or nausea, vomiting, dizziness. Some parents said they'd never thought about a connection between pesticides and symptoms like these and others said, "Well, this is something that farm workers just have to suffer with—it happens to everybody in the fields. We think this problem of low-grade poisoning is widespread. For example, during our summer study of children, we tested 12 of their parents. All the parents were working in crops where organic phosphates are used. 7 out of the 12 tested had depressed cholinesterase levels, none in the critically low range, but below the lower limit of normal. Again, what do these tests mean? The implied mandate for more research is clear; provision to that end as contained in HR 13373 is strongly supported by our group.

Let me talk more generally now about the problems that a physician in a place like rural Tulare County faces. Our county is the second richest agricultural county in the world. Cotton, with 125,000 acres under cultivation, is the largest crop in our county; DDT compounds are applied regularly—but cotton is almost completely mechanized so few of our patients are ever in the cotton fields. Grapes, with 73,000 acres, oranges—69,000 acres, olives—11,000 acres, peaches and plums—14,800, are our other major crops. Each of these depends heavily on farm laborers for cultivation and harvest activities. Each of these crops is protected by organic phosphate sprays. Each of these four fruits is well surrounded by broad leaves—which accept and hold "powder and dust"—as the workers call the pesticides. Each of these crops

* See Appendix A.

is picked by people working on "piece rates"—i.e. the more sacks or boxes filled, the higher the daily wage. This means that the harder they work, the greater is the exposure to the poison. The more the worker perspires, the greater the potential for absorption of poison through the skin. This is the cycle producing greater health hazard to the hardest workers. The workers—(my patients)—complain frequently of headaches, nausea, dizziness, nervousness, of waking up at 5 a.m. feeling sick as they dress for work. They joke about the field boss calling them all "sickly", saying—you people are always passing the Hong Kong flu to one another on the road to work. The workers, more and more, think the sprays cause their sickness, but there is not much field work in our county where organic phosphate sprays are not present and so many of them accept chronic discomfort as the price of earning a living. (I don't think this is acceptable—the workers are entitled to work in greater safety). Once in a while, one of these workers passes out, or gets so weak that he can't work, or vomits near the point of dehydration—and comes in for care. We have started cholinesterase testing on all these victims the last few months. By this time, their levels are often already very depressed. They receive medical treatment then. But they must also stay away from the fields until their body reproduces the cholinesterase enzyme—which takes up to ten weeks. I want to see a system where sprays are tested for being people-safe as well as plant-safe before they are marketed. The workers health, like the harvest, is a valuable commodity. Right now, nobody has the responsibility for this. Any worker who is around organic phosphate pesticides regularly must be guaranteed the right to routine testing. He must be informed of the results of his blood test before it is so depressed that he has clinical symptoms and must face a longer period of disability.

The responsibility for this testing cannot be placed solely on the worker. There are many reasons why farm workers won't come regularly to the physician with early symptoms. For example, if they come as a Workmen's Compensation case (which means their employer pays for the care because the illness is work-related), many fear that they will lose their jobs. If they come with the idea of paying themselves, not realizing their symptoms are work related, it is expensive for proper care and laboratory testing and they will delay. I believe the routine testing should be required as a condition of employment. No company using organic phosphates should be allowed to employ a man unless he has monthly cholinesterase blood test reports showing he is normal. These tests should be made readily available to the workers. When farm workers become completely unionized, this will certainly be a problem which will be negotiated and written into contract, with workers and/or employers bearing the cost. I believe this is the appropriate long-term solution, but we cannot afford to wait for this to happen before we begin action.

The tests could be financed in part by one of the following ways:

a. A special sales taxe added to organic phosphates sales, which revenue would pay for the cost of testing of people working around them.

b. Each test drawn could be filed as a workmen's compensation case with the company's insurance carrier, if there were any indication that the person was affected.

c. Federal funds should be appropriated to state and then county health departments and these tests could be performed by the laboratories in the local health department offices in each county on a low cost mass production automated scale. This is accepted practice for the infectious diseases like tuberculosis and other public health problems. In other areas of employment, I don't believe the burden of payment should be born by the already underpaid workers. Neither should the test be a physical burden on the farm worker simply because he is being unwillingly subjected to possible pesticide poisoning. The very minimum safeguards enacted should provide for tests available within 10 miles of the place of employment conducted on company time, ideally, being tested at the work site. An analogy which immediately comes to mind is the case of chemical companies contracting with the Atomic Energy Commission. It is inconceivable to imagine employees working in areas of radiation hazard leaving their place of work without the rigorous showers, decontamination procedures, and strictly monitored tests for radiation exposure. I am not necessarily suggesting "pesticide badges' similar to the radiation badges worn by these radiation workers. The point is simply that a program of preventive medicine is often taken for granted in other industries where there is potential danger to its employees. The lack of similar safeguards for the agricultural industry should no longer be tolerated. Workers

whose tests show depressed levels should be required to stop work until their blood enzymes return to normal and they must be compensated for time lost through the workmen's compensation insurance fund of the employer. During the months of April through October 1969, there were 75 workmen's compensation cases treated at Salud. 26% (16) of this total were suspected pesticide poisonings. At the present time, workers are not compensated for the 1st 7 days of a work incurred illness or injury unless hospitalized. Because of obvious financial pressures, it is difficult to convince patients with minor symptoms of pesticide poisoning to remain off the job for sufficient period of time to completely recover. For example, of the pesticide cases just mentioned, only one remained absent from work for more than eight days. The worker should not and cannot bear the financial burden of this occupational hazard!

In order to provide routine testing more laboratory facilities must be established to carry these out. Right now, there is no place in our county's health and medical care complex where bloods can be tested for pesticide residues. This, in spite of the fact that there are 27,000 farm workers employed this month in our county. *FPS Report.

I believe *part* of the reason why the poison cases are so seldom reported now is that it is so difficult to get the tests run. Cholinesterase levels must be determined within 24 hours of the time blood is drawn. At present this means we must send a staff member with the blood 20 miles to the Greyhound Bus depot, pay for the blood to travel, spend another 50¢ on a long distance phone call to the lab 70 miles away to inform them to dispatch one of their employees to meet the bus and take the blood to the lab for analysis. This procedure is inconvenient and expensive. Legislation requiring testing must make funds and/or technical assistance available so that laboratories in each agricultural county are equipped to do pesticide residue testing on a mass scale.

My second area of concern in treating our patients working in agriculture relates directy to a point in the bills you are considering—the physician's problem in dealing with the medical consequences of "trade secrets". Most workers who come in with symptoms, acute or low-grade, have no idea what sprays were used on the trees or vines they have been working in. We have an excellent system of poison control information centers in this state and across the U.S. relying on the physician knowing which poison has caused the patients illness. Such information must be always immediately available to physicians.

I do not believe your proposed legislation will make it any easier for me to treat poisoned victims for the following reasons. First, those spray operators who are currently required to report spray patterns to our County Agricultural Commissioner's office deposit their information with an agency which is open only 40 hours a week. A poison information center cannot operate on this limited basis; a patient can't be held from 5 p.m. Friday till 8 a.m. Monday, to find out what poisoned him. Secondly, small farmers who mix and apply their own sprays, and commercial operators who spray "special combination compounds" are exempt from all reporting of spray composition and schedules. If we try to find the rancher, just informally, when one of his workers presents at the office, it is sometimes impossible to get in touch with him quickly. If the "trade secret" argument is compelling to you as a general principle, then I urge you to make at least a special provision for supplying information to licensed physicians and hospital emergency rooms. The name of a poison is an unacceptable secret in our office.

Perhaps you should require counties to contract with a hospital or the well established nation-wide poison control center system so that they will receive information about all sprays used, on an area-by-area basis. Whatever system you decide upon must, however, have information available 24 hours a day, 7 days a week, and must receive reports from all agricultural employers who ever apply any pesticide which may have adverse effects on persons who accidentally or routinely come into contact with them. It is totally wrong that one man's trade secret or payroll size should preclude another man's receiving appropriate and/or emergency medical care. I believe there is urgently needed a federal law to prohibit the commercial production and marketing of any new pesticide, until there is a blood test specific to identify early poisoning and a specific treatment regimen that is effective for that chemical. There should be normal values known specific for each age group, as well as pregnant women. Tests for all commercial chemicals already on the market must be developed within 2 years with age-specific normal

values determined along with a treatment program or the product be immediately removed from the market until this is done.

My third area of concern as a rural physician is with the carelessness, almost indifference, which prevails in work with and around very dangerous poisons. Sometimes this nonsense is legally and administratively correct.

The safety precautions exercised by spray company employees on the job is one case in point. But I would like to wait and have Mr. George Crowder testify to this. The current regulations about time lapse between the application of pesticides and the "safe entry point" for people returning to sprayed fields is a second point that concerns me. The rules may be conscientiously followed by all employers. But there are overlapping areas of responsibility when one group does the spraying and a second runs the crews, so that people sometimes enter prematurely.

The rules designed to keep people away from fresh or active sprays are definitely not adequate. They assume, against all rules of nature, that a fine powder, applied by planes or truck rigs, will always fall only on the area for which it is intended. This is simply not so, and so many people's symptoms and sicknesses are a function of the wind or of "spray-drift". For example, a truck rig is applying parathion to a field with distinct boundaries. Parathion is a powerful organic phosphate which must have 14 days to dissipate before people can safely enter a field where it has been sprayed. A family's small children are playing outside their home on this ranch which is 10 feet from the edge of the orchard. The children are sprayed directly. The family is forced to live in the ranch house during the 14 day dissipation period. All may develop the set of symptoms which the 14 day wait was designed to avoid. Or a crew is picking fruit along one rancher's property line, a safe three weeks after the trees have last been sprayed. This property line is clearly marked by a narrow dirt access road which an adjoining rancher also uses. The neighbor, a small operator who doesn't have to report spraying, schedules, sends his rig out to spray his orchard. The spray rig travels along the access road, and points his equipment to the right. By evening the workers of his neighbor, on the left of the road, are all getting sick, but they are replaced by others who work the trees along the road which have one day old spray on them. Running the further risk of exposure. The laws about safe entry are based on an assumption that individual property lines are adequate boundaries for monitoring traffic. They must be rewritten to consider that winds blow across property lines and that sprays fall, at best, into a rural environment, caring little about who owns which part of the dirt below. (introduce pictures)

If that class of agricultural chemicals which can do such great potential harm to people is necessary to the industry, then there must be area-wide industry responsibility for monitoring spray application and safeguarding the work force. To say as we say now, that one rancher may legally spray his neighbor's workers, but not his own, is totally unsatisfactory.

My fourth and final point of concern is that so much ignorance still abounds among farm workers and others about the toxic effects of pesticides, about early symptoms of illness, and about health and safety practices which workers should follow. Although I think this is slowly changing, there is not an active and accurate education program going on anywhere. There are exaggerated fears and false information among some workers, a studied indifference among others and total ignorance among still too many others. I don't think changes in the law, however well-written, will make a lot of difference unless the people also understand why there is any law at all and feel free to help enforce the law. You could never get an appropriation large enough to hire enough inspectors to remove all the danger of pesticide poisoning from rural America. To illustrate, look at our state's Industrial Welfare Commission rules on field sanitation for farm workers. The law is there, but the prescribed toilets, drinking water and hand-washing facilities, are not. There are two inspectors for the entire San Joaquin Valley. Lack of enforcement of this law contributes to the problem of pesticide residue—people can't wash their hands and face before leaving work.

In most industries education and enforcement is a responsibility accepted by the union of workers involved. But although the farm workers' union has begun working to inform people, they don't have enough contracts to cover all the areas involved.

People need to learn about the importance of protective clothing, about the disposal of spray-covered clothing, and about the importance of bathing well after work. At our local child care center, for example, there is a new

ruling that parents cannot pick up their children until after they have gone home and showered and changed clothing. This, because children run and want to be picked up by the parents who are covered by sprays.

People need to know that they should refuse work if spraying is being done in an adjoining field and that they should wash exposed parts of their body during the day, especially when the residues on the trees they are working are heavy.

People also need to know the symptoms of pesticide poisoning so that they will present for early medical care. Many do not associate vague symptoms like headache, vomiting, dizziness, nausea with the sprays. In our summer health study of children, for example, we asked parents whether their children had any of hundreds of symptoms to rule out different health problems. Of those children who had complaints which are considered part of the pesticide poisoning syndrome, only 1 out of 3 had seen a doctor for their symptoms. Yet, children with these symptoms had an average cholinesterase plasma level of 3.46±.86 and an average cholinesterase red blood cell level of 11.22 ± 2.32 as opposed to an average plasma of 4.18 ± .87 and an average RBC of 12.42 ± 1.17 for children studied who had n symptoms of pesticide poisoning. This finding strongly suggests that certain symptoms are associated with lowered cholinesterase and that children or adults with these symptoms should be under a doctor's surveillance. Early medical care, which may involve removing the person from the source of his illness, would probably cut down sharply on the number of actual cases seen.

And I cannot project all the ignorance and blame onto others. The medical profession is, in many cases, not well informed. The physicians at our clinic have only this summer really began to work up patients' with an eye toward ruling out pesticide poisoning. Our practice of medicine has changed as we became aware of our patients' working environment. Until this spring, for example, we had never used cholinesterase testing as a diagnotic tool. Now we use it reguarly.

In summary, my concerns with new health and safety legislation fall into three major areas.

First, there is a need for law to encourage research into the effect of agricultural chemicals on the work force. New chemicals on the market must be proven people-safe as well as plant-safe. If the proposed phaseout of DDT comes, it seems probable that there will be increased use of the more toxic organic phosphate sprays. I am not sure that this is any bargain for the farm workers.

I am very sorry to have to talk about research at all. Farm workers are always being studied, it seems. But I feel that this area must be studied, well and quickly. It is really appalling that an isolated rural doctor's office should be the one doing the first research project in the country on the cholinesterase levels of children. I am sorry that we must go through the long and tedious process of many research years before we know whether the sprays that will be used liberally during these research years are causing chronic disabilities to workers and their children. But I would urge that a crash program be initiated through your legislation so that many agricultural areas can use the coming harvest season as a time to learn about what is happening to the chronically exposed work force.

Second, there is a need for law which better regulates the application of spray, which requires identification of all sprays used by all agricultural enterprises, which makes testing facilities available and tests mandatory as a condition of employment, and which builds a strong education program for all those people who need to know more.

Thirdly there is need for the kind of law which can be translated into meaningful administrative procedures. This involves recognizing the compex patterns among ranchers, commercial spray operators, labor contractors, and groups of farm workers. Too often laws regulating the agricultural industry have been passed by a zealous but isolated majority and they never really work out in our rural counties. Enforcement must be adequate, worker education must encourage public enforcement of the law, and there should be economic sanctions built into the law so that those who continue to use sprays incorrectly are held responsible for the medical care and full compensation pay for those who become disabled.

Before I turn the stand over to some patients and friends who came with me, let me add one final point. I realize that your committee's concern today is limited to occupational health, but a lot of us who are not agricultural

workers are also concerned about the presence of so much pesticide in and around our homes, our children, our food. I am concerned about what appears to me to be a steady invisible trend toward the ultimate total pollution of our rural environment. I like where I live and I want to stay there, well and practicing medicine.

There follow statements by certain of Dr. Mizrahi's patients, including: Violet Absher, Petra Ojeda (translation by Thierry Brun), Lupe Arellano, Nelda Mirelez, Elma Espinosa.

APPENDIX A.—CHOLINESTERASE LEVELS OF CHILDREN FROM SALUD CLINIC, AUGUST–SEPTEMBER 1969

Gamma	R.B.C.	Age	Ethnic	Sex	Child works	Parent works
			MORE THAN 25 PERCENT BELOW LOW			
1.76	6.75	16	Mexican-American	M	yes	yes
2.14	8.25	16	Anglo	M	yes	yes
2.40	11.05	8	Mexican-American	F	no	yes
2.52	11.85	14	do	F	no	yes
2.70	10.80	14	do	F	yes	yes
			BELOW LOWER LIMIT OF NORMAL			
2.83	9.60	3	Mexican-American	F	no	yes
2.91	13.70	15	do	F	yes	yes
2.91	13.45	11	do	F	yes	yes
2.98	12.70	14	do	F	yes	yes
2.98	12.00	12	do	F	yes	yes
3.02	10.95	14	Negro	F	yes	yes
3.09	12.25	15	Puerto Rican	M	yes	yes
3.25	10.45	4	Negro	F	no	yes
3.38	12.00	4	Mexican-American	M	no	yes
3.40	12.40	8	do	F	no	yes
3.41	11.80	2	do	M	no	yes
3.44	15.50	14	Anglo	F	no	no
3.82	13.75	13	Puerto Rican	M	yes	yes
3.52	13.72	12	Anglo	N	no	no
3.59	12.30	14	Mexican-American	F	no	yes
			NORMAL RANGE			
3.60	14.40	10	Anglo	F	no	yes
3.60	12.00	3	Mexican-American	M	no	yes
3.68	9.60	5	Anglo	F	no	yes
3.71	11.45	12	Mexican-American	F	no	yes
3.78	11.80	12	do	F	no	no
3.84	12.20	10	do	F	no	yes
3.84	12.25	6	do	N	no	yes
3.84	12.25	5	do	F	no	yes
3.95	11.70	4	do	M	no	yes
4.00	10.80	5	do	M	no	yes
4.00	11.50	5	do	M	no	yes
4.08	10.80	6	do	M	no	yes
4.08	16.30	6	do	M	no	yes
4.16	11.50	7	Anglo	F	no	yes
4.24	11.25	3	Mexican-American	M	yes	yes
4.24	12.00	15	do	F	no	yes
4.28	10.96	2	Anglo	M	no	yes
4.30	10.15	5	Mexicna-American	F	no	yes
4.33	10.85	14	do	M	no	no
4.44	13.20	12	do	F	yes	yes
4.47	9.60	12	Anglo	F	yes	yes
4.52	13.80	14	do	M	no	no
4.53	14.80	8	Mexican-American	F	no	yes
4.56	15.35	4	do	M	no	yes
4.59	12.55	13	do	M	DK	DK
4.63	15.55	12	do	F	no	yes
4.70	12.00	12	do	M	yes	yes
4.71	13.35	11	do	F	yes	yes
4.72	12.60	6	Anglo	M	no	no
4.80	12.00	2	Mexican-American	M	no	yes
4.88	10.10	6	do	M	yes	yes
4.88	9.60	5	Anglo	F	no	yes
5.00	11.70	15	Mexican-American	M	DK	DK
5.10	14.95	11	do	F	no	yes
5.40	12.50	5	Negro	M	no	yes
5.60	11.05	9	Mexican-American	F	yes	yes
5.64	13.05	13	Anglo	F	no	no
5.79	12.90	12	do	F	no	no

Source: All values above related to normal ranges as reported by Nabb and Whitfield 1967, for adult population without known exposure to pesticides.

[From the Fresno Bee, Dec. 29, 1969]

Chemical Overkill Reduces Yields, Gets Blame as Hazard to Health

By Ron Taylor

This is the first of five articles dealing with hazards to animal and plant life evolving from the use of agricultural pesticides and what can be and is being done to cope with the problem.

Operating on the pesticide theory that if a fly swatter kills flies, a sledge hammer will be a super killer, too many growers are destroying production, poisoning workers and polluting the environment.

These scare words are a calculated verbal sledge hammer, used the way some growers over-use chemical pesticides to "make sure" all the bugs are extra-dead. But overkill tactics—verbal of chemical—can cause more problems than they solve.

Obviously farmers do not destroy crops, poison workers or pollute the environment—intentionally. Growers do need effective pest control. Until now chemicals have provided this control, making the American cornucopia possible.

But at what cost? Have deadly chemicals affected the environment? The plant physiology? Wildlife? And, most important, human life? Just asking the questions generates heated controversy.

Despite millions of dollars spent in research, despite a complexity of government regulations, every indicator shows: Farmers, in the San Joaquin Valley and elsewhere, are in serious economic, ecological and environment trouble with pesticides.

Agriculture is on a chemical treadmill. To push the soil to maximum yields, farmers add ever increasing amounts of chemical fertilizers. And, as old bugs develop incredible immunities and once obscure insects turn into voracious pests, growers use more and more chemical poisons.

The US Department of Agriculture (USDA) reports farm pest controls are up to $3 billion a year, and rising. Pesticide production increased 40 percent in five years, yet USDA reports say insects and plant diseases still cut production potentials by 25 to 30 percent.

In California pesticide treatments have doubled in a decade. Applications now total an estimated 50 million pounds a year. Another 3 million tons of fertilizer chemicals—primarily nitrates—go into the soil each year. This is a 900,000-ton increase in the past decade.

California growth figures are easy to shrug off, but these are not growth figures. They show increased use of chemicals on the same 8 million to 8.5 million acres of land which has been farmed in this state for the past 10 or 15 years.

Chemicals are supposed to increase yields, and profits. For the most part they do but not always. While problems vary from place to place, there are areas, such as the Imperial Valley, where entire crops are threatened as much by the pesticide program as by the bugs.

The farmer is damned if he does, damned is he doesn't. The pink bollworm invaded the Imperial Valley cotton fields, probably coming over the Colorado River from Arizona. Growers have controlled the pest somewhat by repeated, heavy insecticide attacks.

But spraying every day with broad spectrum phosphates has caused secondary bug problems. The cotton is now being attacked by other insects, bugs which previously had been no serious problem.

Reason: The insecticides used have killed off all the natural predators which once controlled the beet army worm, the looper and the leaf perforator. These worms have become resistant to most sprays, and are now moving into 120,000 acres of nearby lettuce and sugar beets.

Of particular concern is the leaf perforater, because of its genetic ingenuity to develop immunities rapidly. It is now resistant to all but one of the 14,356 chemical killers available. And in Latin America even that single, DDT-type spray would not kill the perforater.

Dr. Barry Commoner, Washington University botanist and environmental expert, commented, "California is beginning to experience the kind of insecticide-induced disaster already common in Latin American experience."

He pointed to the Canete Valley in Peru, where DDT applications in 1949

boosted cotton yields dramatically—but temporarily. The number of insects attacking cotton grew from seven to 13, several became resistant to pesticides, and by 1965 crop yields were down by half, despite heavy spraying.

Dr. Commoner says, "If the ecologically blind practice of massive insecticide treatment is allowed to continue, there is a danger of permanently losing the natural protective insects, and agriculture may become hooked on insecticides."

UC TEST RESULTS

Along the West Side of the San Joaquin Valley field tests by the University of California show cotton farmers may be using two or three times too much pesticide. This runs costs up, creates more bug problems, and, inexplicity, is lowering yields in some fields.

These UC scientists are finding nature controls these crop-eating bugs, often before they do economic damage. But they report too many farmers react to bugs with angry passion. Bugs are threats, it is better to be safe, they feel, and so they kill the bug before any damage is done.

One major West Side grower, concerned about the rapid increase in pest control costs, said, "We know they (UC entomologists) are on the right track. We've got to make some changes, possibly cut way back on pesticides, even if it means taking a small drop in yield, due to bug damage."

Right now cotton has the most serious pest control problems but it is by no means the only crop faced with some form of this crisis. All fruits and vegetables require pesticide controls. One citrus grower explained, "Until now, I've been both now I've got red scale in the trees."

To wipe out the tree-killing scale the grower must kill all the bugs in the grove—friend and foe alike—and this will put him on the pesticide treadmill.

FREQUENCY INCREASE

"I don't like it, I'm going to be using parathion, and I'll have to spray more often. Its going to cost more . . ." he shrugged helplessly.

Parathion is one of the many deadly, but relatively short-lived, phosphate-based poisons which are close relative of the nerve gas which killed Utah sheep near an Army chemical warfare proving ground. These organic phosphates are replacing the long lasting, chlorinated hydrocarbons of the DDT family.

In the pesticide controversy, many blame the rapid banishing of DDT for the increased use of phosphates. DDT was the super bug killer, it was cheap, relatively harmless to man in its immediate, noticeable effects. It saved millions of lives around the world.

But now it appears to have latent, cumulative properties injurious to man and beast. The DDT family lingers in the environment, it accumulates in the soil, in plants, in fatty tissues of warm-brooded creatures and aquatic life.

It may, or may not, be responsible for the elimination of bird and animal species; it may, or may not be, becausing cancers or liver problems, but all of this is really beside the point. DDT's effectiveness as a bug killer has been steadily declining for years. The extremly toxic phosphates are developed as DDT replacements, and the bugs are developing immunities to these too.

STUBBORN NATURE

The problem, in a properly sprayed nutshell, is that nature refuses to abdicate to man. When the delicate ecological balance is disrupted, nature fights back, adapting species to survive the disruption, or bending them off on a new evolutionary tack.

Bugs, plants and wildlife once lived in natural, cause-and-effect balance. Man interrupted and unbalanced this ecosystem when he stripped the land, turned the soil, built canals and injected fertilizers in the soil to grow food and fiber for an increasingly complex society.

Dr. Robert van den Bosch, UC entomologist, says, "The insect revolution occurred too quickly, and with such overwhelming impact, ecological considerations were almost swept aside as farmers fought back.

"Literally overnight (20 years) a welter of unbelievably effective pest killers have been released into the hands of the people concerned—the farmers, salesmen, entomologists and farm advisers.

"These people were unprepared to utilize the materials, and especially to comprehend the genetic and ecological implications of their use."

[From the Fresno Bee, Dec. 30, 1969]

SCIENTIST SEES INTEREST CONFLICT IN SALESMAN ACTING AS CONSULTANT

(By Ron Taylor)

This is the second of five articles dealing with the hazards to animal and plant life evolving from the use of agricultural pesticides and what can be and is being done to cope with the problem.

Chemistry and salesmanship dominate the pesticide industry, according to a University of California entomologist, who feels environmental pollution and pesticide poisoning problems "will not abate until this basic flaw is changed."

The entomologist, Robert van den Bosch, says the emphasis is on bug kill, the tendency is to spray first and ask questions later. With the mandatory phasing out of DDT—growers in San Joaquin Valley still use 1.3 million pounds of DDT type pesticides on 750,000 acres a year—more of the highly toxic phosphates will come into use.

If Van den Bosch is correct, neither the farmers, salesmen, chemical companies nor farm advisers fully understand the genetic and ecological implications of their work with these organic phosphates.

These are the Yorld War II nerve gas-type compounds, now used to wipe out entire bug populations. They break down rapidly into nontoxic residues, leaving fields open to new insect attacks which can build to epidemic proportions unless reportedly sprayed.

As bugs build immunities new chemicals must be developed. It costs a private chemical company millions of dollars to synthesize, test and register a chemical with the US Department of Agriculture and the State of California.

In California 1,261 different manufacturers and distributors, using an estimated 200 basic chemical compounds, have formulated 14,356 bug-killing, disease-destroying pesticides. The major chemical companies supply distributors, who develop their own products. These are sold either to farmers and applicators, or to other, smaller distributors who send their own salesmen out in the field, to sell farmers and applicators.

The distribution and sales of agricultural chemicals is very competitive. Salesmen are employed by the score and the pesticide products are pushed in heavy advertising campaigns.

No one knows how many salesmen work the San Joaquin Valley—a new law requires them to register next year. In addition to selling products, they act as pesticide advisers, checking fields, and prescribing chemical treatments.

Van den Bosch opposes this dual role, suggesting it has a built-in conflict of interest. He feels the pressure on the salesmen to sell gets in the way of ecological values and results in pesticide applications which are excessive, costly and inappropriate to good farming.

Because he is critical of "the system," Van den Bosch is criticized, severely at times. Some chemical companies, distributors and salesmen accuse him of dealing in theory, and not dollar-and-cents facts. They charge he is a one-side advocate of biological (nonchemical) control.

Van den Bosch, and the other university entomologists working with him in the major San Joaquin Valley cotton field tests, counter by explaining they favor "integrated" use of chemicals and biological controls in programs scientifically and economically geared to farm needs, not sales promotions.

A major chemical company's western regional director said, "We do pressure for sales, we are in a competitive business. But growers are sophisticated, selective buyers and they have the advice of our experts, university research, and private entomologists to fall back on.

"We advocate integrated programs too, but without products like (a broad spectrum phosphate) Imperial Valley cotton growers would be out of business. We gave them a chance to check the pink bollworm, and to plant cotton.

Dr. J. L. Reed, a Shell entomologist, in a recent speech said, "As a representative of an ethical agricultural chemical company, it is my purpose to recommend to all growers those chemicals, and the proper use of those chemicals, and other practices pertaining to pest control, which will minimize their losses, provide maximum yields and, hopefully, maximize profits to the grower."

Van den Bosch agreed most agriculture chemical companies, distributors and

salesmen are ethical. His criticism is aimed broadly, at the entire system, and he is not alone. Privately, farm advisers, members of agriculture commissioners' staffs and some growers admit the sales pressures are fierce.

PROTECTED SECRETS

Lists of customers, the amounts and types of applications, the special formulations of combinations of different pesticides, all are legally protected "trade secrets." While applicators must register and record their work with the public, tax-supported county agriculture commissioner, this information is classified as secret.

A private entomologist who has earned his living as a private crop consultant for two decades, gave an example of what Van den Bosch means: "We advised a potato grower * * * commercial, bacterial insecticide), but he was sold a broad-spectrum phosphate instead. The bacterial pathogen would have selectively killed the loopers, but would have left the predators. The phosphate wiped everything out."

The potato grower was on the chemical treadmill, and his second and third sledge-hammer treatments compounded the bug problems. A good crop was turned into a disaster.

One of California's largest cotton growers is cooperating with Van den Bosch in the West Side field trials. This grower said proper use of pesticides means an additional half to three quarters of a bale—$50 to $100 an acre, depending on the market.

FAVORS LOWER COST

Current pesticide applications cost cotton growers $30 to $60 an acre, on the average, and Van den Bosch feels this indicates over-kill. His tests, ranging over several thousand acres, show the treatment with an average $12 to $15 cost per acre produces the best economic yields. And some fields, where no treatment was made, produced the most profit.

Kern County Farm Adviser Hodge Black said that in field tests the "no treatment" plots have consistently wound up in the upper half of the yield tabulations.

"We are finding out bugs don't cause as much economic damage as we had thought," he concluded.

Growers, farm advisers, university and chemical company entomologists agree the integrated chemical-biological approach is the best. They also agree heavy pesticide applications are causing other, more complex problems.

In some fields yields are * * * acre, apparently due to some plant reaction to the pesticide chemicals. Black emphasized that while there is an obvious relationship between the lower yields and the chemical applications, "We just don't know what is happening."

In the Imperial Valley, where pink bollworm is being attacked every fifth day, yields are down, costs are way up and the situation is desperate. Ed Swift, state coordinator for the University of California pesticide research programs, said "Things are so serious down there growers are talking about getting clear out of cotton every other year, in an attempt to disrupt the insect life cycle."

'TOO LITTLE KNOWN'

Swift, while he verbally is more cautious than Van den Bosch, tends to agree the pesticide industry is sales-oriented and that too little is known about the economic and environmental "thresholds beyond which more pesticide means less profit and more problems."

Then Swift pointed to another pressure on the farmer: "The housewife demands good-looking fruit." Shoppers will reject blemished, but wholesome citrus. In citrus, a bug called thrip causes a white ring on the outside, but no interior fruit damage. Growers spend $25 to $30 an acre getting rid of thrip because ringed fruit does not sell.

In the end all of this pesticide pressure and controversy fall back on the shoulders of the grower; he has the ultimate in responsibility. He has a season's investment tied up, and the bugs threaten his production. The inclination is to kill the bugs, to keep ahead of infestations.

The problem is by no means confined to crop yields and production losses.

[From the Fresno Bee, Dec. 31, 1969]

Poisoning Threatens Hundreds; Field Hands Most Vulnerable

(By Ron Taylor)

This is the third of a series of five articles dealing with hazards to animal and plant life evolving from the use of agricultural pesticides and what can be and is being done to cope with the problem.

In the next year 1,400 Californians will be poisoned or injured by pesticides or other agricultural chemicals. Nearly half will be disabled for a time, most will recover, but nine or 10 will die.

These predictions are made from official California occupational health records which show half the casualties will be farm workers. Of the 151 pesticide and agricultural chemical-caused deaths reported over a 16-year period, 85 of the victims were children.

These reports label farm work one of the most dangerous jobs around, primarily because of accidents with these deadly chemicals. And a current public health survey among farm workers indicates these statistics may only be the tip of a tragic, ugly iceberg.

Dr. Thomas Milby, chief of the state occupational health division, said, "It is our belief that a major, yet unsolved problem in occupational disease, has to do with pesticides: We have to (1) find the extent of the problem, (2) identify the chemicals involved, and (3) design preventive protections."

Extent of the problem? California is the only state which keeps farm labor occupational disease statistics. And these are skimpy, at best, because of the insidious nature of phosphate poisoning symptoms. Victims quite often look and feel as if they are coming down with the flu or a severe cold.

The state pathfinding survey—Dr. Milby emphasized it was exploratory, and did not include medical testing—is turning up hundreds of farm workers who seem to accept such symptoms as occupational hazards they neither understand nor can do anything about.

Eight-five per cent of the 774 workers in one sample reported suffering at least one of the following symptoms: nausea, vomiting, excessive fatigue, excessive sweating, headaches, double vision, dizziness, skin irritation, difficult breathing, nervousness, insomnia, bleeding nose, diarrhea.

Twenty percent had five or more of the symptoms. Only lengthy follow-up medical testing, and long term observation, can positively identify phosphate poisonings. Dr. Milby wants to make such a follow-up, and is seeking federal Food and Drug Administration funding.

NERVE SIGNAL BREAKDOWN

Phosphate poisons destroy an enzyme called cholinesterase. This enzyme is a catalytic agent in the electro-chemical transmission of nerve signals from the brain to certain muscles. Phosphates destroy cholinesterase, then disappear. However, a certain blood test can measure cholinesterase levels and thereby detect phosphate poisoning.

Such poisoning can take place over a long period, at low exposure rates, as the worker moves through the field, picking up residues, breathing residue dust, or mixing and applying the chemicals. The slow absorption depresses the cholinesterase levels, causing respiratory problems and other symptoms which appear to be flu. Remove the exposure and the cholinesterase levels climb back to normal.

The poison, in concentrated form, can take sudden, deadly effect: A 3-year-old child, playing in a field while her parents worked, found a bottle of the concentrated phosphate poison sitting on a tractor. She dipped her finger in, licked it, and was dead within a few minutes.

The problems usually occur among the unskilled and semi-skilled workers. State reports show that of the 156 reports filed by aircraft operators, most of the occupational poisonings occurred among the workers who loaded or mixed the chemicals or who flagged in the field for the pilot. Of the persons poisoned, one-third were less than 20 years old.

EMPHASIS BY UFWOC

The controversy over pesticide problems among workers was brought into sharp focus by Cesar Chavez and his United Farm Workers Organizing Committee (UFWOC).

"The issue of health and safety of farm workers in California and throughout the United States," Chavez said, "is the single most important issue facing the UFWOC. Growers consistently use the wrong kinds of economic poisons in the wrong amounts in the wrong places."

In the Imperial Valley, where cotton growers are attacking the pink bollworm every five days with the most toxic pesticides available, a Farm Bureau official complained government pesticide safety regulations are "almost overwhelming. No known adverse consequences ever have resulted from the proper use of pesticides."

Such statements demonstrate one of the controversial problems. "Proper use" should eliminate adverse consequences, but it does not always come out that way. The most graphic exception was a 1963 occurrence in Stanislaus County peach orchards.

During the growing season farmers applied parathion, a phosphate, several times. Each application was made according to the rules and regulations. The applications were halted in plenty of time to let the chemicals break down into harmless residues before harvest crews went in.

MANY AFFLICTED

Yet 94 workers in six orchards suffered clinical phosphate poisoning. Several were hospitalized. One died. Follow-up investigation by the state showed 35 to 85 percent of the entire peach harvest work force in the area—depending upon which orchard they were in—suffered "significant" phosphate poison problems.

How? For some as yet unknown reason, the parathion did not break down into harmless residue, as it normally does. The workers, as they climbed ladders and reached into the foliage, brushed against and breathed in a chemical residue—a derivation of parathion—far more deadly than the original chemical applied.

The inexplicable happened in the same area four years later, poisoning 25 workers. Such poisonings date back to 1949, when DDT was king bug killer, but the insects were beginning to develop immunities.

In 1949 there were six parathion cases reported; in 1958 public health records show 11 phosphate cases involving 70 workers, were singled out for examination. In 1959 a series of phosphate incidents involved 275 orange pickers, cases quite similar to those of the peach harvests in 1963 and 1967.

SPRAYED FROM AIR

Chavez, in testimony to various congressional committees, has presented legislators with scores of case histories; the California Rural Legal Assistance (CRLA) in six farm worker-pesticide poison personal injury suits, lists many more incidents. They include, for example, 48 strawberry pickers who contend they were sprayed by an airplane as they worked.

Dr. Irma West, for nearly two decades a specialist in the field of occupational health for the state public health service, explained, "The rapidly advancing technological changes in agriculture left the industry behind in dealing with occupational hazards, particularly with agricultural chemicals."

Dr. West recognizes pesticides are needed and that these chemicals, used properly, do provide great benefits. But, she said, "Deaths and serious illness from acute pesticide poisoning—which occur regularly—are a tragic and unnecessary waste of human health and life."

Throughout their writings and their talks, Dr. West and Dr. Milby repeatedly emphasize the need for more knowledge, more research.

"We can, and should establish cholinesterase (blood) test studies," Dr. Milby said. "We have the ability, but what is lacking is the political decision to use this capacity."

LOW CHOLINESTERASE LEVEL

Dr. Lee Mizrahi, a private physician working with the Salud Clinic in southern Tulare County, had cholinesterase tests run on 58 farm worker children. Twenty seven of these young clinic patients showed a low cholinesterase level which, by adult standards, indicated phosphate poisoning.

All were children of farm workers, their age range from preschool toddlers to teen-agers. Most have worked in the fields since they were old enough to

carry a bucket. The great problem to Dr. Mizrahi and other doctors, is that there is no knowledge in this field; no one knows what normal cholinesterase levels are in children.

Dr. Mizrahi said, "This is a tragic, absurd situation, that, in 1969, a study by an obscure, rural doctor (himself) should be the first done on children—why, it is ridiculous."

Because there is no knowledge in this field another pediatrician, in an urban area, has selected a control group of 60 youngsters who have had no field exposure to pesticides. This group is matched, age and sex, to see if some "normal" cholinesterase levels can be determined.

AUSTRALIAN STUDY

In adult populations, the lack of knowledge is almost as complete. Dr. West pointed to a brief study in 1961 in Australia, showing some persons who suffer phosphate exposures sufficient to produce symptoms also seem to undergo personality changes. The study noted depression, irritability, excessive fatigue, forgetfulness, nervousness, but as soon as the exposures were eliminated, these symptoms disappeared—within six months.

In conclusion, she pointed out this may equate in some way with the high accident rates in agriculture.

Tomorrow: A look at agricultural chemicals and pesticides in the environment.

[From the Fresno Bee, Jan. 1, 1970]

CHEMICALS UPSETTING NATURE'S BALANCE? AUTHORITIES DIFFER

(By Ron Taylor)

This is the fourth of five articles dealing with hazards to plant and animal life evolving from the use of agricultural pesticides and what can be and is being done to cope with the problem.

Agriculture's chemical technology—while producing an immediate cornucopia—is a primary threat to the environment. The chemistry of pesticides and fertilizers cripples the life-sustaining balance between earth, air, plants, insects and animals.

This is the belief of Dr. Barry Commoner, an aggressive environmental scientist from Washington University. Contrast his conclusion to the statement of Undersecretary of Agriculture J. Phil Campbell:

"That there is environmental pollution is an undisputed fact. That it stems primarily from agricultural use of pesticides and plant nutrients is not a fact . . . studies indicate that nitrate found in ground water is not associated with fertilizer applied to the land."

These opposing, divisive views well sum up the troublesome controversy over the effect of agricultural chemicals on the environment. Nowhere is this controversy more strongly debated than in the San Joaquin Valley.

Campbell blames the press for distorting and exaggerating and falsely accusing agriculture. But the undersecretary's reference to "studies" indicates a variance from what other authorities accept as facts.

The facts, now being uncovered by joint federal-state studies along the West Side of the San Joaquin Valley, show agricultural fertilizers are one major sources—but not the only source—of nitrates in ground water. These studies are designed to find ways to remove the nitrates from waters draining north into the San Joaquin Delta-San Francisco Bay.

To argue the source of the nitrates is a defensive smoke screen. The pollutants are there, they were not a problem before man arrived, started farming, imported water and fertilized the soil.

But the argument over nitrates—and the other agricultural chemicals—demonstrates there is more here than a difference of opinion, and a lack of specific knowledge. Agriculture feels itself under attack and it is defensive. For two decades it has been going through a rapid, snowballing technological revolution; it has found, through science, a production capacity unequaled anywhere in the world.

The quick success brought with it an assumed self-righteous sanctity that says "don't criticize me, for I give you food." But now, the pellmell rush

into modern farming, is proving to have some undesirable side effects. DDT and related chlorinated hydrocarbons appear to have harmful medical side effects.

A few weeks ago the Federal Food and Drug Administration, (FDA) condemned another large commercial fish catch. This time it was mackerel, caught by Los Angeles area commercial fishermen, which had too much DDT residue in the fish tissue.

RHINE FISH TRAGEDY

In Germany and Holland last summer a chlorinated hydrocarbon used the world over in orchards and vineyards, was blamed for killing tons of fish in the Rhine River. In California and Arizona, a broad-spectrum phosphate used extensively in cotton was found to be deadly to pheasant, quail and other birds.

Such chemicals have the approval of the US Department of Agriculture, through its pesticide registration division, and the FDA sets residue tolerance levels. Each chemical is registered only after millions of dollars have been spent by the chemical manufacturer in research and testing. The USDA and FDA review the company findings and then establish safe use and residue tolerance limits.

Yet, after all of this, such chemicals too often prove to have destructive environmental side effects. Dr. Commoner, in a recent talk to the California Governor's Conference on Changing Environment, warned, "In the search for benefits from science and technology, we have become enticed into a nearly fatal illusion, that we have escaped from the dependence of man on the rest of nature.

EXPENSIVE GAINS

"Much of the good that you have produced in California, through the intelligence and hard work of your people, has been won at terrible cost . . . that cost is the destruction of your environment . . . California has begun to experience environmental disaster from the intensive use of insecticides."

Dr. Commoner referred to phosphate spraying as is now being conducted at five-day intervals in the Imperial Valley. No bug, good or bad survives, but within a few days the pest populations, free of predators, and growing resistant to specific chemicals, explode into epidemic proportions.

Azodrin, one of these highly toxic, broad spectrum phosphates, has become a mainstay in the cotton industry, despite the fact that the University of California has refused to recommend its use. From a bug-killing standpoint, it is one of the best.

It is also showing unexpected side effects on wildlife. The California Fish and Game Department found it kills pheasants, quail and other birds. There are no "body counts" to indicate epidemic problems, but there is enough evidence to warrant the pesticide's assignment to the "injurious materials" restricted use list.

ACCEPTS RESTRICTIONS

The manufacturer, Shell Chemical, acknowledges the side effects. It voluntarily agreed to the restrictions on use, and has worked closely with the fish and game officials in exploring the cause and effects of the problem. The company also has aided individual farm counties in preparing maps of areas where the product should not be used.

Shell also warns its Azodrin customers that the product is a sledge hammer that kills all bugs including beneficial predators, and therefore it should not be used at certain times of the growing season. The company recommends other products—including those of competitors—be used when beneficial predators are needed in the cotton.

No one I talked to questions the ethics or the honesty or the dedication of the chemical companies. But many scientists, government officials at all levels, and even some company officials feel there is a snowballing effect in the use of agricultural chemicals because of sales pressures.

BUILD-UP IN WELLS

Dr. Commoner is most concerned about the nitrate build-up in water. The US Public Health Service has reported several areas in California, including

some in the San Joaquin Valley, have water wells with nitrate counts above the tolerance level of 45 parts per million.

High nitrate concentration in babies can result in a fatal disorder called methemoglobenemia. Dr. John Goldsmith of the California Department of Public Health said at a meeting in Delano in October, however, that no cases of the malady existed in California at that time.

The problem of nitrates in Delano water has been recognized for some time, although its extent in the city supply has been the subject of dispute. In 1952 tests of Delano wells showed only "trace" nitrate levels.

In 1966 at the request of the Delano Junior Chamber of Commerce the state tested the city wells and found "nitrate concentrations in excess of the (US Public Health) limit," 70 to 78 parts per million.

Last November, however, claims by a "Committee For Safe Water" that illness had resulted from drinking city water, prompted the Delano City Council to order an analysis by a private laboratory. City Manager Gerald Minford reported the test showed "the water very good for domestic and drinking purposes."

EXTENDED SURVEY

The state recently began a year long study in the Delano area. One part will consist of testing the blood of every baby born in the Delano area. Another part will seek to determine if there is anything the babies eat or drink which would cause the nitrates to turn into nitrites within the body, which Dr. Goldsmith describes as "the really harmful chemical and the one that causes the problems."

State and federal research teams at Firebaugh, on the West Side of the valley, say the denitrification of the San Joaquin Valley waters draining north to San Francisco will cost millions of dollars. If these nitrates are not removed, they would cause an ecological chain reaction which would seriously affect the delta area and San Francisco Bay.

ALTERING OF SYSTEM

The build-up of nitrates would create algae problems that in turn would "clog" the water and stream channel purification processes. The result would be pollution that, again in turn, would trigger changes in aquatic system and fish life.

Dr. Commoner explained the environment is a huge, complex living machine, a delicate balance of inter-related causes and effect.

"Every human activity depends upon the integrity and proper function of this living machine," he said.

Without green plants there would be no oxygen; without inter-action of aquatic plants and animals there would be no pure water; without the biological processes in the soil there would be no food crops, no oil, no coal.

Dr. Commoner's words often sound like those of a doomsday prophet. He feels the heavy infusion of nitrates—chemical fertilizers—pollutes the underground waters and rivers which drain the San Joaquin Valley.

"The agricultural wealth of the Central Valleys" he says, "has been gained at a cost that does not appear on the farmer's balance sheets—the general pollution of the state's huge underground water re- * * *

"Most of Lake Erie has been lost to pollution. In Illinois every major river has been overburdened with fertilizer drainage and has lost the powers of self-purification. Every major city is experiencing worsening air pollution. The entire nation is in the grip of an environmental crisis."

Next: What is being done? What can be done?

[From the Fresno Bee, Jan. 2, 1970]

REMEDIAL STEPS CONFIRM FARM CHEMICAL HAZARD

(By Ron Taylor)

This is the last of five articles dealing with hazards to animal and plant life evolving from the the use of agricultural pesticides and what can be and is being done to cope with the problem.

After all the ambivalent generalities are uttered to mask prejudice in the illusion of objectivity, after each bitter argument dies, few can deny that agricultural chemicals create environmental problems.

Pesticides are costing farmers money, productivity and the goodwill of urban neighbors; farm labor suffers pesticide poisoning in as yet undetermined numbers; wildlife is threatened by some poisons, and water is polluted by nitrates in some areas.

While officials at all levels defensively proclaim agriculture's virtues—a point not in contention—government's halting steps toward corrective actions confirm the problems exist.

DDT and its chlorinated hydrocarbon relatives are being entirely banished from California, over a two-year period. New state licensing and registration programs, new and more stringent controls on agricultural chemical use are now being invoked at the state and federal levels.

And these first, tentative steps give credence to Rachel Carson's warnings in her book "Silent Spring." Before looking at the new measures, examine how the system has worked. And remember, California leads the nation in the controlled, regulated use of agricultural chemicals and pesticides.

State Agricultural Department Director Jerry Fielder explains California's pesticides registration program establishes an "injurious materials" list, requires posted notification of all pesticide use, demands that workers be informed on how to safely handle any pesticides they work with. In addition, the state conducts its own residue sampling program.

While there are many regulations and codes, just one will demonstrate California's concern: "No injurious materials or restricted materials shall be applied under any circumstances or in any location where damage, illness, or injury appears likely to result, through direct application, drift or residue, to persons, animals, or crops other than the pest, or vegetation which the material was intended to destroy."

In 1966–67 California registered 14,356 agricultural chemical compounds synthesized from 200 basic chemicals by 1,261 different manufacturers and distributors. The US Department of Agriculture (USDA) also supervises and regulates these chemicals, and the Federal Food and Drug Administration (FDA) establishes pesticide residue limits.

All of this makes agricultural chemical use sound safe. However, the system does not always work. A federal General Accounting Office investigation of the USDA pesticide registration division revealed not one of the 2,000 violations of UDSA pesticide regulations found over a two-year period was prosecuted.

The assistant pesticide division director, Harold Alford, acknowledged there had been no prosecutions "for several years," but said some prosecutions are now "in the works." He explained his division now has the authority to recall or revoke pesticide registrations.

The USDA pesticide registration division does none of the product testing. It only inspects the chemical manufacturers' test records and data. The registration is based on the review of the private producer's data.

CONFISCATIONS

The FDA, charged with maintaining a watch on products as they are sold, does some testing for pesticide residues. When violations are found, such as the Los Angeles area mackerel catch which contained too much DDT, the FDA confiscates the product.

However, an internal FDA study group last year found the agency could not do the job it was charged with, because it was understaffed. The FDA is supposed to police 60,000 firms which produce $130 billion in products, yet it has only a $72 million budget.

In California, Dr. Thomas Milby, director of the occupational health division, State Public Heath Service, made a similar observation about California's pesticide regulation programs. Testifying before a congressional committee recently, he observed the relatively few state and county inspectors must police chemical programs on 50,000 commercial firms.

The system in California works primarily through the individual county agriculture commissioner and his staff. The pesticide user must go to the commissioner's office and fill out detailed forms. The applications are checked,

inspectors go into the field for spot checks of the work, and the staff advises and counsels farmers and commercial applicators on proper usage.

EFFECTIVENESS DOUBTED

Some commission staff people in various counties feel the system may look good, but they say the voluminous paper work does not control the pesticide treadmill which too often runs out of control. Sales competition, prejudice, fear, all contribute.

One of these staffers put it this way, "There is a tendency on the part of the farmer to over-use pesticides. He wants to kill bugs. And there is a tendency on the part of the salesman to over-sell, because he wants to make money. We need pesticides, but we also need to police their use more stringently."

A private entomologist, a professional insect and plant disease expert, commented, "The pesticide industry is product-oriented and profit-motivated."

Starting Jan. 1, new state laws require each distributor to get a license, and each must register his sales staff. (For the first time, the total number of salesmen will be tallied.) Salesmen can no longer make an oral pesticide application recommendation. They must put it in writing.

After Jan. 1 each application will be reported by chemical content, by amount, by specific location. All of this information will be fed into State Agriculture Department computers. No commercial applicators will be issued pesticide permits. From now on, farmers will have to purchase the pesticide and name the applicator on their purchase permits.

INTEREST CONFLICT

But even with these steps, University of California entomologist Robert van den Bosch feels the chemical pesticide industry and farmers are still on a self-destructing path. He feels there is a basic conflict of interest when a salesman acts as a pesticide diagnostician, advising the farmer whether or not he should treat, and with what chemical.

"It is hard to conceive of a highly complex technology without a profession to implement it, and yet this is true in plant protection," he said.

Bosch, whose West Side experiments in cotton cover thousands of acres, said, "It has been my experience in developing integrated (natural, biological and chemical) control programs that only after the grower has been backed to the wall by economic disaster does he seek alternatives to the traditional use of insecticides.

"Until he is desperate, the farmer wants only the cheapest, most deadly, broadly toxic type of insecticides, and he is under constant pressure from the insecticide industry to use such products."

What is being done to protect the workers? One expert from the agriculture industry—a man who works closely with growers—commented, "I think there is a danger to workers, now, and I believe Cesar Chavez is right in seeking protection for farm laborers who work in the fields. I think Chavez is wrong, however, to make an emotional issue out of it and use this in the boycott."

CONTACT PROVISO

To protect the farm workers under United Farm Workers Organizing Committee contract with the Perelli-Minetti vineyards near Delano, the UFWOC and the company have agreed to a "health and safety" clause in the contract. The clause establishes a grower-worker pesticide safety committee and spells out precautionary regulations.

UFWOC Vice President Delores Huerta recently told a Congressional committee that all of the state and federal rules and regulations do not protect farm labor from pesticide poisoning. Chavez contends growers in an effort to boost profits consistently use the wrong chemicals in the wrong amounts at the wrong time.

* * * pesticide effects on farm workers. The California public health officials are conducting the "pathfinding" surveys for this study in California. This door-to-door San Joaquin Valley survey is turning up hundreds of workers and their families who report symptoms that could indicate phosphate poisoning.

TEST REQUIRED

In the field of wildlife, Agriculture Department officials at the state and federal level now require the chemical companies to test the effects of future pesticides on game birds before the product is registered. And USDA is now re-evaluating all those chemicals which have proved injurious to wildlife.

A $3 million joint federal-state study is now under way to find ways to pull the nitrates and other pollutants out of San Joaquin Valley waters which will drain north into San Francisco Bay.

All of these steps are, according to environmental experts, headed in the right direction. But they are also efforts to shut barn doors after the horses have scattered. All agree, too, that the pest pesticide approach is the use of natural predators, biological controls.

Sterilization of male insects—effectively used in the Southeast to wipe out screwworm, and now used in the San Joaquin Valley against pink bollworm—is one such technique. Others include use of bacteria and virus which attack insects and diseases, sex traps, hormone changes. And entomologists are searching the world over for natural predators.

SMALL RATIO

In the past 80 years scientists have imported 520 predators, but only 20 of them have done an effective job. Under Secretary of Agriculture J. Phil Campbell summed it up: "Most of these developments, however, are years away from widespread, practical use. For a considerable time, therefore, pesticides will continue to be our main weapon against pests.

"The outlook is for stricter controls over pesticide production, packaging, labeling and use."

These words sound reassuring, but so do the existing codes which prohibit the use of pesticides in any way which is injurious.

Dr. Barry Commoner, Washington University environmental scientist concludes on a more somber note: "If we are to survive, the environment must be maintained as a balanced, harmonious whole. We must all work together to preserve it. If we fail, we shall abandon the place where we live—the thin skin of air, water, soil and living things on the planet earth—to destruction. The obligation which our technological society forces upon us is to discover how humanity can survive the new power which science has given it."

Behavioral and Electrophysiological Effects of Dieldrin in Sheep

G. A. VanGelder

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Alterations in the EEGs of sheep exposed to dieldrin occurred prior to clinical toxicity. Behavioral investigations of the effect of dieldrin exposure in sheep have produced the following results: Dieldrin had no effect on the extinction of a conditioned avoidance response, or on the learning of a detour problem. Dieldrin exposure had a deleterious effect on the relearning of a visual discrimination problem. Preliminary work has indicated that dieldrin exposure causes a decrement in the performance of a vigilance task.

Our laboratory has taken a functional approach to the investigation of the effects of pesticide exposure. Valuable insights into the nature of pesticide toxicity may be gained by studying the intact organism in its interactions with its environment. This philosophy has resulted in the development of a multidisciplinary team approach to the problem. The disciplines of toxicology, psychology, physiology, biomedical electronics and pathology have been successfully integrated in the development of methods for the evaluation of the biological effects of pesticides.

Presented at the Sixth Inter-American Conference on Toxicology and Occupational Medicine, University of Miami, Coral Gables, Florida.

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The sheep was selected as the experimental animal for the following reasons: 1) it is a relatively large brained mammal, 2) it is placid and quiet, offering little danger or inconvenience to the experimenter, and 3) it is particularly suitable for use with the telemetric techniques of physiological monitoring as it does little scratching, rolling or rubbing. Dieldrin was selected as the neurotoxicant to be investigated because of its widespread use in agriculture and because of its persistence in the animal body.

Dural electrodes were chronically implanted bilaterally over the frontal, parietal, and occipital cerebral cortex. The electrodes terminated in a mass of dental acrylic anchored to the skull. The electroencephalograms of the unrestrained sheep were recorded via battery-powered, dual channel, FM radio transmitters, and were recorded on an ink-writing polygraph.

The animals were continuously observed on closed circuit television. Control recordings were made from each sheep during the day and evening for a one or two week pre-exposure period, after which exposure to orally administered dieldrin was begun.

The EEG changes observed prior to clinical toxicity consisted of bursts or spindles of high amplitude (200-300 μv), slow waves (4-5 Hz) occurring in one or more leads (Figure 1). These bursts usually occurred simultaneously in all leads and were of one to three seconds duration. The occurrence of these slow waves was related to dosage. As exposure continued the slow wave activity occurred more frequently and was of greater duration. With sufficient exposure convulsive seizures occurred and the EEG consisted of high amplitude fast waves with some spike-wave complexes similar to those seen in petit mal epileptic seizures. The post convulsive EEG was irregular with high amplitude, slow frequency components present.

The presentation of high intensity, variable frequency strobe has precipitated convulsive seizures in exposed sheep prior to the occurrence of clinical toxicity. Further investigation with the use of repetitive auditory stimulation is under way.

Before discussing the behavioral work done in our laboratory a comment on the necessity of utilizing behaviorial techniques in the investigation of the effects of neurotoxicants is appropriate. It must be remembered that it is the ability to behave in an appropriate manner in a particular situation which determines in large measure the survival of the animal, and to an extent that of the species. Therefore, if neurotoxicants are capable of affecting behavior it is important that we be aware of this. Subjects must be studied with a variety of behavioral measures which test both their learning and performance capabilities. It is only when this is done that the behavioral effects of neurotoxicants may be evaluated.

In an avoidance experiment 20 sheep were trained to a 90% criterion to make a conditioned avoidance response (CAR) following the presentation of a conditioned stimulus (CS) in order to avoid an unconditioned stimulus (UCS). The CAR consisted of jumping a 12-inch barrier, the CS was a light and the UCS was a mild electric shock. Ten of the sheep were then exposed to dieldrin, and extinction trials were conducted. Dieldrin had no effect on the number of trials to extinction, response latency, or the number of spontaneous barrier crossings.

The effect of dieldrin on detour behavior has also been investigated. In a detour problem the animal encounters a barrier along the most direct route to a goal object, in this case a food reward. Dieldrin had no effect on the time it took the sheep to circumvent the barrier and reach the food reward.

The effect of dieldrin on visual discrimination learning in sheep was investigated through the use of a Y maze (Figure 2). Six adult female sheep were used in this study. In this situation the animal was placed in the start box and when the guillotine door was opened had to approach one of two geometric symbols, presented simultaneously in the ends of the arms of the maze, in order to avoid a mild electric shock. One symbol was arbitrarily designated as correct. The animals were given 20 trials per day and training was continued until a criterion of 70% correct responses for three successive days was reached. The sheep were trained to criterion on two problems, matched for performance, and one member of each pair was exposed daily to an oral dose of 10 mg dieldrin/kg B.W. The sheep were then trained on a third problem. If criterion was reached on this prob-

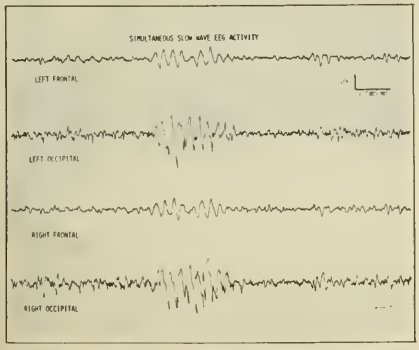

FIGURE 1. Simultaneous high amplitude slow wave EEG activity in a sheep exposed to 25 mg dieldrin per kg B.W.

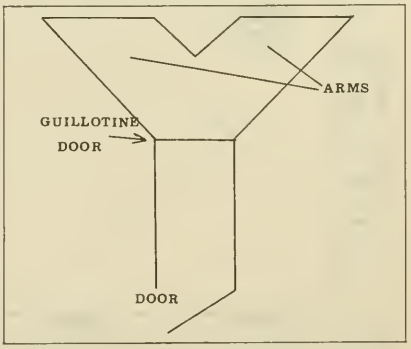

FIGURE 2. Diagram of Y maze used in visual discrimination study.

TABLE 1. *Analysis of Variaace of Mean Trials to Criterion in the Y Maze Study*

Source	df	MS	F
Dieldrin	1	83.37	3.01
error (a)	4	27.70	
Conditions	1	14.36	1.65
Dieldrin × Conditions	1	144.29	16.55**
error (b)	4	8.72	

**p < .01

lem in less than 30 days a fourth problem was presented. Only one sheep met criterion on problem three and received training on problem four. The other five sheep failed to master problem three in the 30 days. All sheep were then tested for recall of problem one.

An analysis of variance (Table 1) performed on the number of trials required to learn, and then to relearn, problem one indicated that there was a highly significant ($p<.01$) interaction between dieldrin exposure and relearning (Figure 3). This means that the number of trials necessary to relearn problem one was dependent upon whether or not the animals were exposed to dieldrin. It should be noted that the number of sheep used in this experiment was small, three in each group, and for that reason it is being replicated. Thus, the present data must be viewed as preliminary, and care must be taken in generalizing from these findings.

Operant conditioning has proved to be a useful and flexible tool in psychopharmacological research. An operant conditioning apparatus suitable for use with sheep has been developed and is being used to study several types of behavior. It should be emphasized that the experiments reported here represent pilot work. This work was undertaken to study the feasibility and effectiveness of operant conditioning in the investigation of the toxic effects of dieldrin. These studies provide an indication of the techniques used and the results found. It must be emphasized that the results, while intriguing, are not definitive. More work is necessary and is being conducted.

The sheep were tested individually in the test chamber as shown in Figure 4. The apparatus was under programmed control. Prior to being brought into this situation the sheep were reduced to 85% of their free feeding body weights. They were then trained to eat from the food hopper, and were habituated to the presentation and retraction of the hopper. Behavior compatible with the pedal-pressing response was selectively reinforced by the use of shaping techniques. Pressure on the pedal closed a switch which caused the food hopper to be presented to the animal for a predetermined period of time. In a short time the animal began to press the pedal.

One animal was trained to respond on a fixed ratio schedule of 40:1. That is, the pedal had to be pressed 40 times before the food hopper was presented. After establishing a baseline of stable responding on this schedule the animal was exposed daily to an oral dose of 15 mg dieldrin/kg B.W. This study is in progress and no results are available.

It has been mentioned that hypersynchronous slow waves occur in the EEG of sheep exposed to dieldrin. Mirsky and Rosvold[1] have reported that this type of EEG activity is associated with impaired attentiveness on a vigilance task. Because of the similarity of the EEG activity reported by Mirsky and Rosvold and that observed in our laboratory an attempt was made to determine whether this type of EEG activity observed in dieldrin toxicity was also associated with impaired attentiveness.

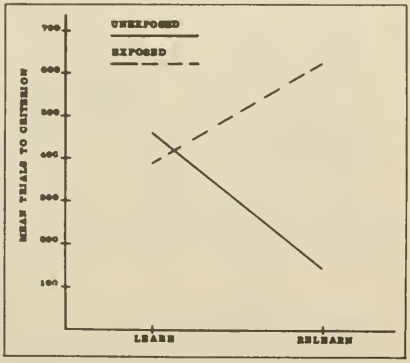

FIGURE 3. Interaction between dieldrin exposure and relearning found in Y maze study.

FIGURE 4. Operant test chamber with subject eating from food hopper.

Through the use of successive approximation techniques two sheep were trained to bar press for food. The animals were then trained to bar press only in the presence of a 5 KHz tone of 6 db intensity. As training progressed the duration of the tone was gradually reduced to 0.1 second. If the animals bar pressed within five seconds after the presentation of the tone there was an automatic presentation of food (corn) for 3.5 seconds. The electronic control circuitry was programmed so that a period of 30 seconds had to elapse between bar presses before the tone was presented. If the sheep bar pressed during this interval, the control circuitry automatically reset the 30 second interval. When the sheep reached a stable response level to tone presentations, bilateral dural recording electrodes were surgically implanted over the frontal, parietal, and occipital cortex. After a two-week postoperative recovery period, three days of control EEG and vigilance performance data were collected. Then the animals were exposed to a daily oral dose of 20 mg dieldrin/kg body weight for three and four days, respectively. The sheep were given a minimum of 100 tone presentations per day and their EEGs were recorded continually throughout the exposure period. Upon termination of exposure the animals were given 50 tone presentations per day until they responded at their pre-exposure rates.

During the pre-exposure period the sheep responded to an average of 82% of the tone presentations. By the second day of exposure, response decrements of 63% and 58% were noted.

The following points should be emphasized: (1) the animals showed no signs of clinical toxicity, (2) when food was presented in the operant chamber they ate eagerly indicating that the performance decrement was not due to loss of appetite and, (3) the animals manifested a definite orienting response (head and ear movements) when the tone was presented, indicating that although the bar press was not made the tone was heard. By the eighth day after termination of exposure the sheep were again responding at their pre-exposure rates.

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Se señala la importancia que tiene determinar funciones tales como la memoria, y sentido de descriminación después de la administración de dieldrín y otros insecticidas. Se observan en animales de experimento alteraciones en el encefalograma siete horas después de la acción de los insecticidas. Estas manifestaciones son previas al cuadro clínico. El uso de la radiotelemetría y la televisión en circuito cerrado es de importancia en la observación de animales que continuaron en su vida normal.

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UNITED STATES DEPARTMENT OF AGRICULTURE
UNITED STATES
DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
WASHINGTON, D. C.

In re	ARTURO GONZALES, TEOFILO GARCIA, ADELINA GURROLA, MAGDELENA HERNANDEZ, ANA BUITRON, JOSE SANCHEZ, FLAZIANO NANO and MIGUEL PADILLA Petitioners	NO. PETITION FOR THE DECLARATION OF PESTICIDE EMERGENCY IN THE UNITED STATES OF AMERICA AND FOR THE ESTABLISHMENT OF PESTICIDE SAFETY PROGRAM

TO: The Honorable Clifford Hardin, Secretary of the United States Department of Agriculture and The Honorable Robert Finch, Secretary of the United States Department of Health, Education and Welfare

This petition is filed on behalf of ARTURO GONZALES, TEOFILO GARCIA, ADELINA GURROLA, MAGDELENA HERNANDEZ, ANA BUITRON, JOSE SANCHEZ, FLAZIANO NANO and MIGUEL PADILLA pursuant to Sections 135, 135d and 135k of 7 U.S.C., and Section 346a of 21 U.S.C. and 21 C.F.R. §120.32(a). All of the petitioners are farm workers and all have been injured by pesticides registered and regulated by the United States Department of Agriculture, and regulated by the United States Department of Health, Education and Welfare. All of the petitioners are indigent.

THE NATURE OF THE PROBLEM IS AS FOLLOWS:

I

Since World War II, the use of toxic chemicals to control pests has been expanded enormously. Each year over one billion pounds of pesticides are now manufactured for use in the United States, including more than 200,000,000 pounds for use in California. Sixty-thousand different trade names are registered for use in the United States, including some 14,356 in California, covering over 200 various basic chemicals. The enormous growth of the use of economic poisons in the last 25 years is similar in magnitude to the growth of the use of motor vehicles in this country after World War I. Economic poisons can be and are far more dangerous than motor vehicles, though they are much less carefully regulated.

II

Largely because of its high use of economic poisons, California agriculture has consistently had the highest rate of occupational illness, injury and death of any industry in the State. Up until December, 1969, the California State Department of Public Health reported the occupational disease rate to be 11.9 for every 1,000 agricultural workers, or more than 2-1/2 times the average for all industrial divisions in the State, which was 4.5 per thousand. From 1951 to 1967, 151 persons in California were reported to have suffered accidental deaths as a result of contact with economic poisons. Thirty-four of these fatalities occurred while persons were working in agriculture.

III

Large though these estimates of injury may seem, the State Department of Public Health has continually issued warnings that its estimates have been understated. As the State Department of Public Health noted in its 1969 report, the statistics

released (up until December 10, 1969) have been based only upon The Doctors First Report of Worker Injury, which are sent to the Department only when an injured worker reports to a doctor, receives medical treatment, misses a day of work and applies for workmen's compensation. Until December 10, 1969, the State's statistics were not based upon any consideration of injuries which involved less than a day of work, or which were not reported to doctors, or which did not involve a workmen's compensation claim. The State's figures also failed to include occupational injuries incurred by self-employed farmers and unpaid family labor, who make up 28% of the California agricultural work force, and did not include injuries suffered by self-employed one-man operations in structural and agricultural pest control work. As the State Department of Public Health stated in its 1965 report, "The Doctors First Report of Worker Injury usually describes only acute illness caused by agricultural chemicals. Information is needed about possible long term effects of continuous exposure to agricutlural chemicals and about sequelie resulting from acute episodes." (Occupational Disease in California Attributed to Pesticides and Other Agricultural Chemicals - 1965, p. 21.)

VI

On December 10, 1969, the State Department of Public Health released a report indicating the extent to which previous figures on the pesticide injury rate had been badly underestimated and announced more realistic estimates of the actual number of injuries caused by pesticides in California agriculture. The report stated:

> "The evidence for this has evolved from a recent pilot study conducted by a federally funded project administered by the Department which suggests that only a fraction of pesticide poisonings come to the attention of official agencies, under present circumstances. Between January, 1968, and September, 1969, forty cases of systemic effects (nausea, dizziness, etc.) attributed to organophosphate insecticides, such as parathion, were

> reported by physicians, under California Workmen's Compensation program, among Tulare County agricultural laborers. Since there are a minimum of 18,000 field laborers employed in the County at all times, this translates into an incidence rate of less than 1.3 cases per 1,000 workers per year.
>
> "During the same period of time, nearly 200 persons in a house-to-house survey of 1,120 Tulare County farm laborers reported the same types of systemic effects, and went to a physician for treatment--but paid the fee themselves, or had it paid by the Medi-Cal program, and thus do not appear in Workmen's Compensation data. This translates into a rate of about 150 cases per 1,000 workers per year. And it leaves out of account a large number of farm laborers who said that they experienced the same types of symptoms but did not seek medical care, and hence could not appear in any of the official statistics." (State Department of Public Health, A Report to the 1970 Legislature on the Effects of the Use of DDT [and] similar Pesticides on Human Health and the Environment, Part III, p. 1.)

Thus, according to statistics released in the last three months, by the State Department of Public Health, the acutal pesticide injury rate among farm workers in California is 150 per 1,000 workers, or almost 14 times the rate previously supposed, and 33 times the average injury-illness rate for all industries in the State.

y

Since the statistics contained in the State Department of Public Health's December 10th report were based solely on those injuries which were treated by doctors, they still failed to report those injuries which did not occasion a visit to the doctor's office. If the latter kinds of injuries are also considered, the pesticide injury rate among farm workers turns out to be still higher than the already astronomically high figures reported by the State Department of Public Health in its December 10th report. One of the interviewers involved in the State's field investigation reported in August, 1969, that of the 774 workers who filled out questionnaires which are now in the possession of the State, 548, or 71%, reported that they had

suffered eye irritation as a consequence of contacts with pesticides; 309, or 40% reported headaches; 249, or 32%, skin irritation, 188, or 25%, difficulty in breathing; 145, or 18%, unusual fatigue; 141, or 18%, nausea or vomiting; 122, or 16%, nervousness and insomnia; 115, or 15%, dizziness; 52, or 7%, pain in the fingernails; 51, or 7%, burning and sore throats; and 26, or 3%, nosebleeds. (Statement of Cesar Chavez, Director of the United Farmworkers Organizing Committee, before the Senate Subcommittee on Migratory Labor, as reported in the Congressional Record, Vol. 115, No. 161, October 3, 1969.) Over 80% of the farm workers injured suffered some injury or illness, which means that during the current year, for every 1,000 farm workers, 800 are likely to suffer some kind of injury from pesticides.

This is an injury-illness rate of 800 per thousand, or 160 times the tabulated injury-illness rate for all industries in the State. Since there are approximately 200,000 farm workers in California, it can be estimated that the number of workers who will suffer some illness or injury from pesticides this year is in the neighborhood of 160,000. Even if this number, which is astronomical, were to be divided by four, 40,000 workers would be injured this year, based upon present estimates.

But this only begins to describe the problem.

VI

Not only are pesticides responsible for the highest frequency of injuries in the State, they also cause injury which is much more serious than that suffered in other situations. As the State Department of Public Health reported in 1966: "The severity of illness caused by agricultural chemicals is indicated by the greater frequency with which workers were expected to lose time from work with such illness, as well as by the greater frequency with which they are hospitalized, compared with occupational illness from all causes....Forty percent of workers with

occupational disease attributed to agricultural chemicals were expected to lose some time from work, nearly twice the proporation as for all [non-pesticide] agents. Ten percent of such workers were hospitalized, almost three times the proportion of those hospitalized for illness from all causal agents." (Occupational Disease in California Atributed to Pesticides and Other Agricultural Chemicals - 1966.)

VII

Of all the pesticides that are now used in the United States, the most toxic is the organic phosphate family, which includes Tepp, parathion, thimet, phosdrin, demeton, EPN, and methyl-parathion. Originally developed by the Germans during World War II as the central ingredient in nerve gas, organic phosphate chemicals were converted for agricultural use after 1945. As the Technical Bulletin for Physicians points out, "it is the phosphate ester [organic phosphate] pesticides with which the physician should be most familiar. Among them are the most hazardous of all pesticides...." (State Department of Public Health, Diagnosis and Treatment of Phosphate Ester Pesticide Poisoning, Technical Bulletin for Physicians, p. 2.) A single drop of Tepp on the skin can prove fatal. Parathion, the most widely used of the organic phosphates, is at least 120 times more toxic to the human skin than is DDT. An oxygen analog of parathion, paraoxon, which can form as a residue on foodstuffs sprayed with parathion, is 10 times more toxic than is parathion. Thimet and Phosdrin are also more powerful than parathion, and are approximately 130 times more toxic than DDT.

VIII

At least 55 million pounds of highly toxic organic phosphates were used in the United States in 1967, approximately a quarter of which were used in California. 1,152,819 pounds alone were applied in Imperial County, California, in 1967, as

opposed to only 369,691 pounds of chlorinated hydrocarbon pesticides (including DDT) -- or three times the quantity of less toxic chlorinated hydrocarbons applied. (State Department of Public Health, Occupational Disease in California Attributed to Pesticides and Other Agricultural Chemicals - 1967, p. 3.)

IX

Given their high toxicity and frequency of use, it is not surprising that the organic phosphates are today the main killers and cripplers of agricultural workers in California. In 1966, the organic phosphates were deemed to be responsible in 74% of the serious pesticide injuries reported to the State's doctors.[1/] Of the less serious occupational disease reported to doctors in 1967, organic phosphates were implicated in 22% of the cases, or twice as many cases as involved in the next most injurious category of compounds. In 1966, organic phosphates were involved in 19% of the reported cases of less serious occupational injury. (State Department of Public Health, Occupational Disease in California Attributed to Pesticides and Other Agricultural Chemicals - 1967, p. 12.) Forty-four percent of all the persons who have been killed by pesticides while they have been working have been killed by organic phosphates. (State Department of Public Health, supra, p. 8.)

X

Despite efforts by the State Department of Public Health, to warn farm workers, and the public generally about the dangers of organic phosphate pesticides, farm workers have repeatedly been struck by epidemics of organic phosphate illness. In July, 1949, in Marysville, California, at least 56 men became seriously ill while picking pears covered with parathion residue, despite

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1/ Serious injuries are usually referred to as "systemic poisonings" or those generalized illnesses caused by toxic substances in which signs and systems are present in more than one system of the body.

the fact that a residue analysis, done two days before the picking started, had indicated that the parathion residues were not high on the fruit. At least 20 to 25 of the men were hospitalized. (Quinby and Lemmon, Parathion Residues As a Cause of Poisoning in Crop Workers, Journal of the American Medical Association, Vol. 166, No. 7, February 15, 1958, pp. 740, 741-42.) In May, 1951, near Delano, California, 16 men were hospitalized after having picked grapes sprayed with parathion. (Quinby and Lemmon, supra, p. 741.) In August, 1952, in Riverside, California, 10 men were hospitalized after picking oranges sprayed with parathion. In July, 1953, in Riverside, California, 7 orange pickers became ill; and within the same month, 2 more outbreaks occurred in the same county. (Quinby and Lemmon, supra, p. 742.) In 1959, more than 275 orange pickers were poisoned in a series of outbreaks, despite the fact that the organic phospherous pesticide residue level on the crop was well below the legal tolerance (1 ppm of parathion) set by the State Department of Agriculture (West, Occupational Disease of Farm Workers, Archives of Environmental Health, Vol. 9, July, 1964, pp. 92, 95.) In 1963, in Stanislaus County, 95 peach pickers became clinically ill as a result of contact with parathion residues, and over one-third of the group (which was working in three orchards) was hospitalized. (Millbe, et al., Parathion Residue Poisoning Among Orchard Workers, Journal of the American Medical Association, Vol. 189, No. 5, August 3, 1964, pp. 351, 352.) Although after the 1963 epidemic, the State Department of Agriculture passed more stringent restrictions on the use of parathion on peaches, another outbreak of organic phosphate poisoning among peach pickers occurred in Stanislaus County in 1967, this time seriously afflicting at least 25 workers. (State Department of Public Health, Occupational Disease in California Attributed to Pesticides and Other Agricultural Chemicals - 1967, p. 13.)

issued any further reports indicating whether any subsequent pesticide epidemics have occurred.

XI

Not only are the organic phosphate pesticides responsible for more frequent injuries to farm workers, they also cause more serious injuries. Almost half of the occupational fatalities resulting from pesticides involve the organic phosphate chemicals. Reported the State Department of Public Health in 1966:

> "For illness attributed to organic phosphate pesticides, physicians advise their patients to take time off from work even more frequently than for all agricultural chemicals, and found it necessary to hospitalize more than one in four of these patients." (State Department of Public Health, Occupational Disease in California Attributed to Pesticides and Other Agricultural Chemicals - 1966, p. 8.)

Once back on the job, the farm worker who has been injured by organic phosphates must refrain from any further contact with organic phosphate chemicals or with their residues, if he wishes to avoid subsequent injury.

XII

Children are the age-group most likely to be seriously afflicted by toxic pesticides. Not aware of the dangers and unable to read highly technical language on pesticide containers, children, not surprisingly, have accounted for 60% of the accidental deaths attributable to pesticides. (State Department of Public Health, Occupational Disease in California Attributed to Pesticides and Other Agricultural Chemicals - 1966, p. 2.) The children of farm workers, who accompany their parents to the fields, are the most vulnerable of all to injury. Injury may come to them in a variety of ways, such as contact with discarded pesticide containers. Illustrative is a case reported to the State Department of Public Health in 1965. While a group of Mexican-American farm workers were picking berries on a large ranch, a three-year old girl and her four-year old brother were

playing around an unattended spraying next to where their mother was working. The four-year old took the cap of a gallon can of Tepp left on the rig. The three-year old put her finger in it and sucked it. She vomited immediately, became unconscious, and was dead on arrival at the hospital. The child weighed 30 pounds; she had taken a dose lethal enough to have killed a 200-pound man.

XIII

The occupational group in the agricultural industry which is most afflicted by pesticide injuries and diseases are farm workers. Forty-nine percent of all pesticide injuries reported in 1967, for example, involved farm workers. (The next most affected occupational groups, "other laborers," and "semi-skilled operators," each accounted for 15% of the injury reports.) (State Department of Public Health, Occupational Disease in California Attributed to Pesticides and Other Agricultural Chemicals - 1967, p. 19.)

Farm workers employed in the San Joaquin Valley account for the majority of all pesticide injury reports filed for agriculture. In 1965, for example, farm workers in the San Joaquin Valley were involved in 53.9% of the injury reports filed. (State Department of Pubic Health, supra, p. 14.)

A pesticide accident described by the State Department of Public Health in 1964 is indicative of the kind of danger which these farm workers face.

> "Twenty-five farm workers in the San Joaquin Valley became suddenly ill with the nausea, headaches, giddiness, blurred vision, sweating, and other symptoms typical of phosphate ester poisoning. They had been unloading bags of Thimet-treated cotton seeds from trucks, loading the planters, and piling and burning the empty bags. No washing facilities or protective clothing were available to these workers." (West, Occupational Disease of Farm Workers, Archives of Environmental Health, Vol. 9, July, 1964, pp. 92-96.)

Furthermore, they had not been told what pesticide they were

dealing with or the extent of danger posed to them or what precautions to take to avoid injury.

XIV

Not only are pesticide injuries in agriculture numerous and serious, but they are increasing. From 1964 to 1965, the State Department of Public Health reported that the pesticide injury rate in agriculture increased 6%. (State Department of Public Health, 1965 Report, p. 8.) From 1965 to 1966, the injury rate increased 8%. (State Department of Public Health, 1966 Report, p. 5.) From 1966 to 1967, the last year in which surveys were made by the State, the injury rate increased 33-1/3%. (State Department of Public Health, 1967 Report, p. 7.)

XV

This injury rate is likely to climb even higher in the future. The growth of pesticide injuries in California has been paralleled by an increase of the use of pesticides in agriculture, particularly of organic phosphate compounds. From 1960 to 1966, the use of organic phosphates increased by at least 160%, as opposed to a growth of 25% for all other pesticides. With the prohibition of the use of DDT in California and in other parts of the United States, organic phosphates will be used even more frequently in the future, and, unless adequate steps are taken, the pesticide injury rate will increase correspondingly. As the State Department of Public Health concluded in its December 10th report:

> "It has been predicted by pest control specialists that as the usage of DDT and other persistent organochlorine compounds is eliminated, increasingly great amounts of organophosphate pesticides will be used both on the farm and in the home. Since the members of this latter family of chemicals are generally more toxic to humans than are the organochlorines it is possible, or even likely that we will witness an increase in the incidence of both occupational and home pesticide morbidity." (State Department of Public Health, A Report to the 1970 Legislature on the Effects of the Use of DDT [and] Similar Pesticides on Human Health and the Environment, Part III, p. 2.)

XVII

Since the growing season begins in March in most parts of California, and in many other parts of the United States, and the use of pesticides increases markedly in the growing season, and because organic phosphate pesticides are likely to be used even more frequently this year than they have been in past years, a pesticide emergency now exists in the State of California and in the United States. This period of extreme danger will continue throughout the primary growing and harvesting season, from March through October, when over 75% of the year's pesticide injuries normally occur.2/

XVI

The dangers posed by pesticides, particularly by organic phosphate chemicals, are not restricted to the State of California, but exist throughout the United States where organic phosphates are used. Petitioners are informed and believe and on the basis of such information and belief allege that four-fifths of the organic phosphate pesticides manufactured in the United States are used in States other than California. Petitioners further allege that the regulation of pesticides by the State of California, while inadequate, is nonetheless more thorough than is the regulation by many other States and that, consequently, the dangers posed by pesticides is even greater in these other States.

WHEREFORE, Given The Nature Of The Problem Described Above, Petitioners Seek The Following Reief:

(1) An official pesticide emergency should be immediately declared by the Secretary of Agriculture, acting in conjunction with the Secretary of Health, Education and Welfare,

2/ State Department of Public Health, Occupational Disease in California Attributed to Pesticides and Other Agricultural Chemicals - 1965, Table 9, p. 35.

pursuant to the powers vested in them by 7 U.S.C. §§135 and 135d, which gives to the Secretary of Agriculture the power to regulate the registration and sale of economic poisons, and by 21 U.S.C. §346a, which gives the Secretary of Health, Education and Welfare the power to promulgate tolerances so as to protect the public health.

(2) Pursuant to the duty imposed by 7 U.S.C. §§135, 135d and 135k, the Secretary of Agriculture, acting in cooperation with the Secretary of Health, Education and Welfare, should establish a safety program to protect farm workers, as well as the public generally, from the dangers of organic phosphate pesticides.

(3) The Secretary of Agriculture should, within thirty days, call a public hearing in Washington, D. C. to give to all interested parties the opportunity to testify as to what should be contained in the pesticide safety plan, and as to what further conditions should be attached to registration permits issued for organic phosphate pesticides.

(4) Before said hearing is held, the Secretary of Agriculture and the Secretary of Health, Education and Welfare should undertake to determine the extent to which laws relating to the safe use of pesticides are being strictly enforced by various States. The findings which the Secretaries make as to the present adequacy of law enforcement should be presented at the hearing which is held.

(5) To the extent that the Secretaries find, or the hearing reveals, that safety laws pertaining to the use of pesticides are not being enforced, the Secretaries should take immediate steps to insure that the law is being fully enforced, pursuant to the duty incumbent upon them, as set forth in 7 U.S.C. §§135, 135d and 135k, and 21 U.S.C. §346a.

(6) Since petitioners are informed and believe, and on such information and belief allege that many organic phosphate

pesticides have been registered by the Secretary of Agriculture without a showing having been made as to whether such pesticides were necessary, given the existence of alternative pesticides and given the public health dangers involved, petitioners request the Secretary of Agriculture, acting pursuant to §135d, to review all registration permits issued for organic phosphates. Pursuant to the power vested in him by §§135 and 135d, the Secretary of Agriculture should issue regulations restricting the registration and use of all toxic organic phosphate pesticides. By way of such regulation, the Secretary should allow the use of organic phosphate pesticides only when a clear showing is made that non-organic phosphate pesticides are unavailable or inadequate for use. The Secretary should also set for each State the maximum number of pounds of organic phosphate pesticides which can be registered for application in said State in any single year. In no case should the maximum number of pounds permitted for all of the States in the county be more than that amount which the Secretary formally finds to be absolutely necessary.

Dated: March 6, 1970.

Respectfully submitted,

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PETITIONS CONTROL BRANCH
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DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
WASHINGTON, D. C. 20204

In re IRENE LOPEZ, ELVIRA GARDUNO, KATHY RADKE, MARILYN VITTOR, LEIGH ROYCROFT, JUAN ZAMORA, and THE ENVIRONMENTAL DEFENSE FUND, INC. Petitioners.	NO. PETITION FOR ISSUANCE OF A PROPOSED REGULATION REPEALING A TOLERANCE FOR A PESTICIDE ON RAW AGRICULTURAL COMMODITIES (21 C.F.R. §120.32)

The undersigned, IRENE LOPEZ, ELVIRA GARDUNO, KATHY RADKE, MARILYN VITTOR, LEIGH ROYCROFT, JUAN ZAMORA, and THE ENVIRONMENTAL DEFENSE FUND, submit this petition pursuant to Section 408(m) of the Federal Food, Drug, and Cosmetic Act, 21 United States Code §346a(m), with respect to the pesticide chemical DDT.

Attached hereto, in duplicate, and constituting a part of this petition are the following:

A. The name, chemical identity, and composition of the pesticide chemical.

B. The amount, frequency, and time of application of the pesticide chemical.

C. Full reports of investigations made with respect to the safety of the pesticide chemical.

D. The results of tests on the amount of residue remaining, including a description of the analytical method used.

E. Reasonable grounds in support of the petition.

Enclosed is a petition submitted to the Commissioner of Food and Drugs requesting waiver of fees, on behalf of all the above petitioners, pursuant to 21 C.F.R. §120.33(l) and (m), in lieu of the fees required by 21 C.F.R. §120.33.

IRENE LOPEZ
ELVIRA GARDUNO
KATHY RADKE
MARILYN VITTOR
LEIGH ROYCROFT
JUAN ZAMORA
THE ENVIRONMENTAL DEFENSE FUND

Per Ralph S. Abascal
RALPH S. ABASCAL

Per James D. Lorenz Jr.
JAMES D. LORENZ, JR.

Attorneys for Petitioners

Dated: October 2, 1969

A. DDT (a mixture of 1,1,1-trichloro-2,2-bis (p-chlorophenyl) ethane and 1,1,1-trichloro-2- (o-chlorophenyl) -2- (p-chlorophenyl) ethane), as defined by 21 C.F.R. §120.147.

B. The amount of DDT used in the United States is considerable. In 1965, 140 million pounds were produced. Rohrman, "The Law of Pesticides: Present and Future," 17 JOUR. OF PUBLIC LAW 351, 355, n. 11 (1968). Also, see Hearings on S. Res. 27 Before the Subcomm. on Reorg. and Inter. Orgs. of the Senate Comm. on Governmental Ops., 88th Cong., 1st Sess., pt. 1, at 8-32 (1963); Howard, Production and Distribution of Pesticides, in OCCUPATIONAL HEALTH ASPECTS OF PESTICIDES 1-9 (1964). Petitioners are unable to specify the exact extent to which the poison, DDT, is used on food owing to the failure of state and federal governments to collect such data. It is estimated that DDT represents 15% of the total agricultural poisons used in the United States. MacDougall, "Summation of The Session on General Aspects of Pesticide Use", 160 ANNALS OF THE NEW YORK ACADEMY OF SCIENCES 69 (1969) proceedings of the Conference on Biological Effects of Pesticides in Mammalian Systems, May 2-5, 1967, New York, New York.

The data as to frequency and time of application of DDT, for various crops, is, upon information and belief, available from registration files in the U. S. Department of Agriculture.

C. Reports of investigations made with respect to the safety of DDT are fully set forth in the appendix, and incorporated by reference, as if set forth fully herein. They include:

1. Innes, et al., "Bioassay of Pesticides

and Industrial Chemicals For Tumorigenicity in Mice: A Preliminary Note," 42 JOUR. OF THE NAT. CANCER INSTITUTE 1101 (June, 1969), marked as "Exhibit A."

2. Kemeny and Tarian, "Investigations on the Effects of Chronically Administered Small Amounts of DDT in Mice," 22 EXPERIENTIA 748 (1966), marked as "Exhibit B."

3. Radomski, Deichmann and Clizer, "Pesticide Concentrations in the Liver, Brain and Adipose Tissue of Terminal Hospital Patients," 6 FOOD AND COSMETIC TOXICOLOGY 209 (1968), marked as "Exhibit C."

4. Lofroth, "Man and DDT Compounds," [Paper delivered to the Deutsch-schwedisches Symposium auf dem Gebiet der Umwelthygiene, June 12-13, 1969, Baden-Baden], marked as "Exhibit D."

D. The results of tests on the amount of residue remain, including a description of the analytical method used, is available from the U. S. Department of Agriculture. Also, such information is available from the Food and Drug Administration. See C.F.R. §120.114, n.1. Such information is not available to petitioners. However, DDT residues cannot be removed from raw or processed agricultural products. Petitioners submit the following studies in support of this allegation:

1. Lamb, Farrow, Elkins, Kimball and Cook, "Removal of DDT, Parathion, and Carbaryl From Spinach by Commercial and Home Preparative Methods," 16 JOUR. OF AGR. FOOD CHEM. 967 (1968), marked as "Exhibit E."

2. Elkins, Lamb, Farrow, Cook, Kawai and Kimball, "Removal of DDT, Malathion, and Carbaryl from Green Beans by Commercial and Home Preparative Procedures," 16 JOUR. OF AGR. FOOD CHEM. 962 (1968), marked as "Exhibit F."

In addition, petitioners are aware of the existence of DDT residues on fresh table grapes from reports that the Food and Drug Administration has conducted tests which prove the existence of such residues. Petitioners hereby request that such data be made available to them in its entirety.

E.

1. Petitioners Are Interested Persons

Petitioners first wish to establish that they are "interested persons," as defined by 21 C.F.R. §120.32, such that they may petition for relief.

Petitioners GARDUNO, LOPEZ, RADKE, VITTOR, ROYCROFT and ZAMORA are all consumers of food products. They are not aware of the extent to which DDT is used on food crops. However, they are aware that DDT is used on fresh table grapes. This has become public knowledge owing to the labor controversy between farmworkers and their employers in the California grape industry.

Petitioners GARDUNO, RADKE, VITTOR, ROYCROFT and ZAMORA are all parents of minor children (Petitioner LOPEZ is a prospective parent, expecting her first child at any moment). They have a deep concern for the welfare of their children, whose welfare appears to be seriously threatened by the omnipresent health hazard posed by the continued contamination of the American food supply by DDT.

Petitioners GARDUNO, LOPEZ, RADKE, VITTOR and ROYCROFT are nursing mothers or are expecting to give birth in the very near future. They have recently heard of reports (e.g., Lofroth, Exhibit D) which indicate that breastfed children are subjected thereby to excessive consumption of DDT, estimated to be twice the maximum average daily intake recommended by the World Health Organization of the United Nations. At the same time, they are moved by a very natural, deep and intense desire to breast-feed their children so as to establish the strong emotional bond and to provide the, otherwise, most nutritious food available to their infants. It is a gross understatement to say that petitioners have deliberated at length over the obvious dilemma. Petitioners wish to have additional children, breast-feed them and free themselves from this dilemma.

Petitioners GARDUNO, LOPEZ, RADKE, VITTOR, ROYCROFT and ZAMORA are all poor persons. [See declarations attached to the accompanying petition for Waiver of Filing Fees.] The diet of poor persons is notoriously low in protein rich foods. The consequence of the two conditions, protein depletion and the storage of DDT in the body, "is associated with decreases in microsome enzyme levels and would, therefore, be expected to cause increased" DDT toxicity. Street, "Organochlorine Insecticides and the Stimulation of Liver Microsome Enzymes," 160 ANNALS OF THE NEW YORK ACADEMY OF SCIENCES 274, 288 (1969), proceedings of the Conference on Biological Effects of Pesticides in Mammalian Systems, May 2-5, 1967, New York, New York.

Petitioner ENVIRONMENTAL DEFENSE FUND, INC. is also particularly "interested" in this petition, but the interest is somewhat different from that of the above-

named petitioners. The ENVIRONMENTAL DEFENSE FUND, INC. is a non-profit corporation and composed of biologists, ecologists, and other persons who are especially concerned about the pollution of the environment by various chemicals, including agricultural poisons, who have devoted long study to such problems and who regularly act on behalf of the public interest to protect the public from the circulation and proliferation of dangerous chemicals. In undertaking such activities, the ENVIRONMENTAL DEFENSE FUND, INC. is also an "interested person," as described in 21 C.F.R. §120.32.

For these reasons, petitioners submit, if they are not "substantially interested persons," then such "interested persons" do not exist in the United States.

2. Reasonable Grounds Exist For The Issuance of a Proposed Regulation To Repeal The Tolerance For DDT On Raw Agricultural Commodities

a. Scientific Evidence.

Heretofore having been constrained by the required form of a petition, petitioners now get to the heart of the matter. Their basic contention is that recent scientific investigations have produced clear evidence that DDT causes cancer in animals and provides very strong indications that it produces cancer in man. The research of Innes, et al., Exhibit A, is clear proof that DDT causes cancer in animals. This study, authored by 13 eminent scientists, and sponsored by the National Institutes of Health, U.S. Public Health Service, Dept. of Health, Education and Welfare, is a

condensed version of a five volume report. It constitutes the initial phase of a study which seeks to determine the carcinogenic (cancer-producing), teratogenic (monster-producing) and mutagenic (mutation-producing) properties of 130 agricultural poisons and related chemicals.

The study by Innes, et al., confirmed the earlier study by Kemeny and Tarian, Exhibit B, which showed the carcinogenic properties of DDT. The primary and compelling significance of the work of Kemeny and Tarian is found in the fact that the accumulated DDT content in the tissue of the experimental animals, 7-11 mg/kg, is approximately equal to that of the content of DDT in the general human population. [See, also, Lofroth, Exhibit D, at 3-4].

The question of the cancerous potential of DDT to man was considered by Radomski, Deichmann and Clizer, Exhibit C. Autopsies were conducted on 271 persons who had died from liver and brain disease. The authors' major conclusion was that "highly significant elevations of pesticide concentration were present in cases of carcinoma [cancer] of various tissues," including DDT and DDE, a metabolite of DDT.

b. Legal Grounds.

Congress has expressed its absolute and

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clear intention to prohibit the adulteration of food supplies by carcinogenic (cancer-producing) chemicals. The Food Additives Amendment to the Federal Food, Drug and Cosmetic Act §409(c)(3)(A), 21 U.S.C. §348(c)(3)(A) provides, in pertinent part:

> [N]o additive shall be deemed to be safe if it is found to induce cancer when ingested by man or animal, or it is found, after tests which are appropriate for the evaluation of safety of food additives, to induce cancer in man or animal....

The Senate Report on the Food Additives Amendment clearly, and with considerable force of language, stated the Congressional intention behind the bill:

> [T]he bill is aimed at preventing the addition to the food our people eat of any substances the ingestion of which reasonable people would expect to produce not just cancer but any disease or disability.***This is also the view of the Food and Drug Administration. Sen. Rpt. No. 2422, Aug. 18, 1958, in 3 U. S. CODE, CONG. & ADMIN. NEWS, 85th Cong., 2nd Sess. 5300, 5310 (1958).

During 1959, shortly after the anti-cancer legislation became effective, the Food and Drug Administration seized a large quantity of cranberries sprayed with the agricultural poison, aminotriazole, based on scientific evidence that it caused cancer. HEW Secretary Fleming stated that:

> The Food Additives Amendment of 1958 [Act, §409(c)(3)(A), 21 U.S.C. 348(c)(3)(A] specifically prohibited the establishment of any tolerance for a chemical found to induce cancer

> in man or animal, and the Administration applies this same principle under the 1954 Pesticide Amendment [the law providing for the establishment of tolerances for pesticides on raw agricultural commodities], too, although it did not contain a similar specific prohibition. Statement by HEW Secretary Fleming, November 9, 1959; see also, FDA Release, November 17, 1969 relating to the same matter, both of which are reported in CCH FOOD, DRUG, COSMETIC LAW RPTR. ¶59,109.03.

In 1960, Congress passed the Color Additive Amendments with a similar anti-cancer clause in §706(b)(5)(B) of the Federal Food, Drug and Cosmetic Act, 21 U.S.C. §376 (b)(5)(B). Several proposed changes to the anti-cancer clause were introduced. The Congressional Report stated that "any of the proposals, if adopted, would weaken the present anti-cancer clause in the reported bill. For this reason all of the proposed changes were rejected by the committee." House Report No. 1761, June 7, 1960, in 2 U. S. CODE, CONG. & ADMIN. NEWS, 86th Cong., 2nd Sess. 2887, 2895 (1960) (Emphasis added).

The Secretary of Health, Education and Welfare, Arthur S. Fleming, testified at length before Congress. The Committee report summarized, and adopted, his testimony. It must be set out here:

> The preponderance of scientific evidence clearly dictates our position: Our advocacy of the anticancer proviso in the proposed color additives amendment is based on the simple fact

that no one knows how to set a safe tolerance for substances in human foods when those substances are known to cause cancer when added to the diet of animals. I should like to underline again one statement in particular which I read earlier from the summary of Dr. [G. Burroughs] Mider's review of the role of certain chemical and physical agents in relation to cancer. It is this:

"No one at this time can tell how much or how little of a carcinogen would be required to produce cancer in any human being, or how long it would take the cancer to develop."

This is why we have no hesitancy in advocating the inclusion of the anticancer clause.

Unless and until there is a sound scientific basis for the establishment of tolerances for carcinogens, I believe the Government has a duty to make clear--in law as well as in administrative policy--that it will do everything possible to put persons in a position where they will not unnecessarily be adding residues of carcinogens to their diet.

The population is inadvertently exposed to certain carcinogens. Ultraviolet light occurs in sunlight. The burning of most fuels produces some minute quantities of chemical compounds that elicit cancer in experimental animals, and some of the same agents can be identified in soot, tars, dusts, and similar residues--even from the atmosphere. In view of these facts, it becomes all the more imperative to protect the public from deliberate introduction of additional carcinogenic materials into the human environment.

Whenever a sound scientific basis is developed for the establishment of tolerances for carcinogens, we will request the Congress to give us that authority. We believe, however, that the issue is so important that the elected representatives of the people should have the opportunity of examining the evidence and determining whether or not the authority should be granted.

> Many have oftentimes expressed the fond hope that the day is not far distant when we shall be able to control cancer. A dramatic breakthrough in this sense may never come. Rather, the progress--looked at from the standpoint of reducing the number of cases of cancer--may come only as we are willing to give heed to the kind of leads that are incorporated in the document prepared by Dr. Mider. It is clear that if we include in our diet substances that induce cancer when included in the diet of test animals, we are taking a risk. In the light of the rising number of cases of cancer, why should we take that risk? Why shouldn't the Government do everything possible to see to it that we do not involuntarily take that risk?
>
> *
>
> This, I believe, is as far as our discretion should go in the light of present scientific knowledge. We have no basis for asking Congress to give us discretion to establish a safe tolerance for a substance which definitely has been shown to produce cancer when added to the diet of test animals. We simply have no basis on which such discretion could be exercised because no one can tell us with any assurance at all how to establish a safe dose of any cancer-producing substance.
>
> Unless and until cancer research makes a breakthrough at this point, the principle in the anticancer clause is sound. (Statement by Hon. Arthur S. Flemming, Secretary of Health, Education and Welfare, before the House Committee on Interstate and Foreign Commerce, January 26, 1960).

In summary, the statement of the U. S. Court of Appeals for the Seventh Circuit reiterates petitioners' position:

> The Delany Clause, 21 U.S.C. §348(c)(3)(A), provides that no additive 'shall be deemed to be safe if it is found to induce cancer when

ingested by man or animal,' and is generally intended to prohibit the use of any additives which under any conditions induce cancer in any strain of test animal. Bell v. Goddard, 366 F.2d 177, 181 (7th Cir. 1966).

Petitioners respectfully request that the Commissioner propose the issuance of a regulation repealing the tolerance for DDT on raw agricultural commodities.

DATED: October 3, 1969.

RALPH S. ABASCAL

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APPENDIX C
Page 1 of 7 pages

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In re: IRENE LOPEZ, ELVIRA GARDUNO, KATHY RADKE, MARILYN VITTOR, LEIGH ROYCROFT, JUAN ZAMORA and THE ENVIRONMENTAL DEFENSE FUND, INC. Petitioners) NO. REQUEST FOR THE IMMEDIATE REPEAL OF ALL TOLERANCES FOR DDT ON RAW AGRICULTURAL COMMODITIES

On October 7, 1969, petitioners filed a formal request calling for the issuance of a regulation repealing the tolerances for DDT on raw agricultural commodities. The petition was premised on the fact that DDT has been demonstrated to be cancer-producing in test animals with circumstantial evidence suggestive of possible carcinogenic effect in humans as well. From the informal response which we have received from the Department it seems apparent that the decision has been made to defer consideration of the serious allegations that were made. Any such deferral would be entirely inconsistent with the policies recently announced in connection with the cyclamates as well as with the plain thrust of the Departmen responsibilities under the Food, Drug and Cosmetic Act. Accordingly, we request that, in view of the prima facie showing of carcinogenicity, the tolerances for DDT residues on raw agricultural commodities immediately be repealed and set at zero.

A petition is being filed today with the Secretary of Agriculture requesting the immediate suspension and cancellation of the registration of DDT as an imminent hazard to human health and the environment. A copy of the petition is attached (without all Exhibits) for your information.

I

On October 18, 1969, Secretary Finch announced that "the use of cyclamate in the production of general purpose foods and beverages [will] be discontinued forthwith." In explanation of his action the Secretary stated:

> Recent experiments conducted on laboratory animals disclosed the presence of malignant bladder tumors after these animals had been subjected to strong dose levels of cyclamates for long periods.
>
> The findings of these experiments form the basis for my action.
>
> The fact that cyclamates have induced cancer in animals was confirmed by a panel of the National Academy of Science, which unanimously reported its findings to me late yesterday. The academy met in special session at my request to review the results of various research projects involving cyclamates.
>
> Before I go any further, let me emphasize in the strongest possible terms that we have no evidence at this point that cyclamates have indeed caused cancer in humans.
>
> Thus, my decision to remove cyclamates from the list of approved substances in no sense should be interpreted as a "life-saving" or emergency measure. I have acted under the provisions of law because it is imperative to follow a prudent course in all matters concerning public health.

Dr. Jesse L. Steinfeld reinforced, and expanded, on Secretary Finch's statement. By way of clarifying the scientific findings which provided the basis for the Secretary's decision to prohibit the general use of the

cyclamates he said:

> There is absolutely no evidence to demonstrate in any way that the use of cyclamates has caused cancer in man.
>
> There is no evidence that the use of cyclamates has caused malformation in children or any other abnormality in humans, other than a rare skin hypersensitivity.
>
> The decisions being announced here today are based on bladder tumors obtained from feeding massive doses of cyclamates throughout the life span of rats. The dosage thus shown to cause these tumors in rats is 50 times the maximum amount previously proposed for adult human ingestion by the National Academy of Sciences and by the World Health Organization. .....
>
> We can in no way at this time extrapolate the new data from rat experiments to human beings. Nevertheless, we in this Department--whether from a legal or from a scientific point of view--cannot afford to ignore any possibility of the rat data being applicable to the human population. As long as this possibility exists, a prudent concern for the health of the public dictates that precautionary action be taken.

It is not without significance that Secretary Finch's action was taken five days after he was advised of the fact that the cyclamates are carinogenic. The clear thrust of the action is that where there is any indication of carcinogenicity in test animals, the substance or compound responsible for that effect is to be treated as "guilty until proven innocent." In the words of Secretary Finch, considerations of the public health make it "imperative to follow a prudent course."

This sense of urgency in the face of scientific evidence suggestive of dangers to human health from the continued use of chemicals was emphasized, this week, by the actions of

Dr. Lee A. DuBridge restricting the use of the weed-killer, 2,4,5-T. Dr. DuBridge announced that:

> The actions to control the use of the chemical were taken as a result of findings from a laboratory study conducted by Bionetics Research Laboratories which indicated that off-spring of mice and rats given relatively large oral doses of the herbicide during early stages of pregnancy showed a higher than expected number of deformities.
>
> Although it seems improbable that any person could receive harmful amounts of this chemical from any of the existing uses of 2,4,5-T, and while the relationships of these effects in laboratory animals to effects in man are not entirely clear at this time, the actions taken will assure safety of the public while further evidence is being sought.
>
> The study involved relatively small numbers of laboratory rats and mice. More extensive studies are needed and will be undertaken. At best it is difficult to extrapolate results obtained with laboratory animals to man--sensitivity to a given compound may be different in man than in animal species; metabolic pathways may be different.

II

There is nothing revolutionary about the "guilty until proven innocent" premise. It is the unmistakable thrust of the Delaney Amendment, 21 U.S.C. 348(c)(3)(A). (Also see 21 U.S.C. 376(b)(5)(B).) And while that Amendment was specifically to the food additives section it has been established since November 17, 1959, that it is no less applicable to pesticides. (See CCH Food, Drug and Cosmetic Law Reporter ¶54, 109.03, discussed in our Petition, pp. 7-8.) That Amendment requires the absolute prohibition of any additive which under any conditions induce cancer in any strain of test animal (Bell v. Goddard, 366 F.2d 177 (CA7, 1966)).

The decision to prohibit the continued use of the cyclamates was based on the Delaney Amendment. The dispatch in which the Secretary acted once having been apprised of the possible carcinogenic consequences emphasizes that in the face of any such a showing considerations of the public health and welfare preclude deferral of action.

Even the regulations promulgated in implementation of the Act emphasize the special responsibility that applies where carcinogenic effects in animals are suspected. In defining the authority of the Secretary to establish zero tolerances where necessary, the regulation cites as an example the situation where "the chemical is carcinogenic to or has other alarming physiological effects upon one or ... more of the species of the test animal used, when fed in the diet of such animals." (21 CFR 120.6.)

As with regard to the cyclamates, a study conducted under the sponsorship and direction of the Department of Health, Education and Welfare has established the cancer-producing characteristics of DDT. (See Innes, et. al."Bioassay of Pesticides and Industrial Chemicals for Tumorigenicity in Mice: A Preliminary Note",42 Journal of the National Cancer Institute 1101-1114 (1969).)

But the need to act without delay is even more critical in the case of DDT. First, while the Secretary was able to report, with respect to the cyclamates, "that we have no evidence at this point that cyclamates have indeed caused cancer in humans," the studies of Radomski, et. al. submitted by petitioners is at least probative circumstantial evidence that

the same conclusion cannot comfortably be reached with regard to DDT. Second, the chemical stability of DDT, with a probable "half-life" of 10 to 15 years, makes it imperative that its usage be prohibited as soon as possible. Lastly, each member of the public, having been warned of the potential danger of the cyclamates, can voluntarily stop the further ingestion of those compounds. But because of the movement of DDT through the ecosystem no element of free choice exists. Like it or not each of us are forced to ingest DDT residues regularly.

It follows therefore that the Secretary's responsibility to protect the public health and well-being from cancer-producing agents can be realized only by the immediate prohibition of any further application of DDT. We recognize that because of the great mobility, persistence, and solubility characteristics of DDT, it is not possible to achieve a zero tolerance by administrative fiat. But these difficulties, rather than excusing immediate action, make the necessity for such action so much more imperative. At a minimum, the Secretary should establish a zero tolerance for DDT and its residues on all raw agricultural commodities with the possible exemption from seizure of any commodities in which it can be established that any residues are the consequence of applications of DDT that were made prior to the announcement by the Secretary of the zero tolerance.

Accordingly, petitioners respectfully request the immediate establishment of a zero tolerance for DDT on raw agricultural commodities. In addition, we request that

you use your full authority as Secretary of the Department of Health, Education and Welfare to ban the use of DDT and obtain its removal from the market.

Edward Berlin

James W. Moorman

Ralph S. Abascal

October 31, 1969

[Cite: 160 ANNALS OF THE NEW YORK ACADEMY OF SCIENCES 418 (Proceedings of a conference, "Biological Effects of Pesticides in Mammalian Systems," May 2–5, 1967, New York City, June 23, 1969)]

SUMMARY OF THE CONFERENCE ON BIOLOGICAL EFFECTS OF PESTICIDES IN MAMMALIAN SYSTEMS

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Just five years ago a gracious lady, dying of breast cancer, published a book called *Silent Spring*. Rachel Carson struck a responsive chord among the public, not only about pesticides, but about man's place in his world. Should man, reaching for the stars and holding in his hands the tools of his own complete destruction, strive for total victories, or seek balance with nature through compromises and partial controls?

The book aroused considerable reaction, especially from agricultural and chemical industries and their spokesmen. Miss Carson was not a toxicologist. Undoubtedly, the case was overdrawn, and errors of fact and interpretation could be identified. Nevertheless, her book does belong in that list of provocative publications that touch man's conscience, such as Harriet Beecher Stowe's *Uncle Tom's Cabin* of 1852, Upton Sinclair's *The Jungle* of 1906, and, more contemporaneously, Ralph Nader's *Unsafe at Any Speed* and Morton Mintz's *The Therapeutic Nightmare*, both of 1965. This meeting, as do many others, represents to a great extent the continued wave of reaction to Rachel Carson's pleas.

It is obvious that modern technology in pesticides, especially Muller's discovery of the antiarthropod activity of DDT, for which he was awarded a Nobel prize in 1948, has provided man with another tremendous power to control his environment. Just as in the case of atomic fission and fusion, this power can be used for purposes to which the human evaluative words of "good" or "evil" are applicable. These attributes are not contained either in atoms or in pesticides; they arise from how man uses them.

World War II, I am told, was the first major war in which casualties caused by military actions exceeded those attributable to disease. DDT was an important, although certainly not the only, reason for this achievement. I know that we became rather contemptuous of typhus fever as we doused whole populations with DDT powder. I also know how much personal comfort was derived from its use in movie houses in San Francisco, which once used to rank among the flea centers of the world.

The obverse side of the coin, even in only the baldest of human terms, is an estimate by the Public Health Service that the average annual death rate in the United States from pesticides in one per million and that nonfatal poisoning is one per 10,000 population. That totals 200 recognized deaths and 20,000 recognized poisonings per year. Although these figures alone define this as a national health problem, the chronic effects on man are yet to be defined. Add to this the many consequences to other species. Add also the fact that this is but one source of continued, mounting contamination of our air, water, food, and every other environmental feature. The problem then acquires the elements for what may well become a catastrophic situation.

Several views, therefore, can be discarded at once as untenable. One is that there is no problem. Two, that things will straighten out if they are ignored, especially by the government. Three, that we really know nothing about the dangers and need a decade of research to determine whether there is a problem.

I wish to call your attention to the fact that these are precisely the stated opinions of the representatives of the tobacco industry in regard to the health hazards of tobacco smoking. I might, for once, put in a good word for them: at least smoking is an individual habit, with the primary decision of to smoke or not to smoke made by the individual. With pesticides and other contaminants, however, Texas meat becomes a New Hampshire problem, Ohio river water becomes a Mississippi problem, and New Jersey air is a New York problem, over which the individual exercises no control, and, for that matter, of which he has little knowledge.

When we deal with human affairs, we cannot avoid, although in our culture we do our utmost, the important question of who owns, distributes, and profits from commodities that are simultaneously our pride of progress and the cause of our concerns. The answers to these questions neither deny the value of the products or their contribution nor impugn the honesty of those with vested economic stakes in the process. They do, however, identify those who, in our traditions of law, should be in the role of witnesses rather than in those of jurors.

I am impressed by the thoughtful program that has already been devised on pesticides, some aspects of which have been reported at this conference. My role, I believe, is not limited to extending well-deserved congratulations. It is, rather, to point out possible needs and improvements, as I see them. They should be considered only as suggestions for further deliberation, for I speak only for myself.

My suggestions will be guided by several principles, or, if that sounds too impressive, by several personal viewpoints. The first is that there is no such thing as absolute safety, and determinations that seek this end-point, in toxicity, carcinogenicity, or any other reaction, are not only impracticable, but impossible to attain. The second is that the idea of studying "all" factors, or the "total" environment and its consequences, is neither desirable nor possible. The aim of the scientific method is to find the key reaction, or the specific circumstance, that allows one to understand and, hopefully, to manipulate to our purposes a complex that we encounter. The third viewpoint is that the most important first step in the resolution of any problem is the exactitude with which one poses the question.

Let us start with the third. Obviously, the questions one asks of different pesticides must in themselves be somewhat different. Such differences are further introduced by the circumstances under which the materials are used. All pesticides, I assume, are used in one of three circumstances: (1) in enclosed spaces, by especially trained personnel, (2) by individuals for individual or family purposes, and (3) over wide areas that involve many individuals who may not even be aware of the procedure.

In my opinion, quite different safety considerations are needed in these three situations. I would like to relate them to some resolutions that have been accepted as applicable to drugs. Thus, pesticides to be used only by trained personnel in circumscribed spaces would be equivalent to drugs released only to experts for experimental purposes. This would apply, not only to new agents, but to such old products as hydrocyanic acid, which is still useful for the fumigation of ship holds as long as rigorous control measures are practiced.

For the release of pesticides for individual use, I would think that the same standards as for the sale of drugs over the counter are applicable: tests for safety and for utility. It is a wonder to me that rather specific procedures accepted to demonstrate these features in pharmaceuticals do not seem to apply with equal

force to commodities that are in even wider use, such as insecticide sprays, unless they are designated as cosmetics.

These considerations become increasingly complex when pesticides are used over wide areas. Again, this applies, not only to new products but to old, time-honored ones such as the arsenicals. In fact, it sometimes seems forgotten that, for the control of rats, the best approach is still to improve housing, which not only inhibits rats, but has some other obvious benefits to the human population.

Insofar as tests for toxicity and utility are concerned, I see no basic distinction between drugs and pesticides, except that in the case of the former the adverse effect is sought against an endoparasitic target, such as a microorganism or a neoplasm, whereas the target of the pesticide is an exoparasite in a pest-man relationship. The aim is to control the endoparasitic or exoparasitic agent without harm to man or other species. In the latter case, of course, the host is usually healthy, so that the measure could be conceived to be one of preventive medicine, whereas in the former case, the goal is most often therapeutic.

As to research preceding the use of the agent, a very similar continuum of procedures and regulations seems applicable. It is in this area that I detect a relative paucity of research on pesticides, as reported at this conference or as I glean from the literature. The paucity is in preclinical toxicology and pharmacology. Where are the "bread and butter" studies on animals, such as required for drugs? This includes acute toxicity, general and local, and chronic toxicity, including carcinogenic, teratogenic, and genetic effects. This involves, by regulation, the use of several species of animals, specifying rats, beagles, and rhesus monkeys.

I am not impressed with the assumptions that human reactions are not predictable from animal studies. This includes the so-called higher integrative functions of the central nervous system, which have not been adequately examined in animal systems. Of course, some effects are not predictable, but the exceptions are far exceeded by the valid information that is derived. Such studies still provide the leads that are accepted as basic in any pharmacologic investigation and can be circumvented at much greater risk than is taken in face of the information being available.

I would like to suggest three areas of research that should be considered before pesticides, as a species of drugs, are released for general use. The first is to conduct investigations in the field, as well as in the laboratory. I have often wondered, for example, why in addition to complicated expensive laboratory models of air pollution, from which many unrecognized factors may be omitted, some animals such as inbred mice are not actually placed in "natural" conditions of air pollution. such as near a highway crossing. Why should not animal toxicology of pesticides be extended to the actual orchard in which the fruit, the insects, and the workers exist, in addition to simulated laboratory models?

Second, we all accept the fact that a vexing situation exists in multiple-agent exposures, with many of the agents being in subliminal concentrations. I know of no adequate study, even with known carcinogens, in which combinations of more than two chemicals have been tested over a wide range of doses. This could be a fertile field for research, although any adequate design implies rather frightening numbers of animals. Further, our experiences with fluoride and selenium should prepare us for possible beneficial as well as adverse effects at trace concentrations of presumably noxious chemicals in our environment.

Third, as for drugs, should we not consider that, at some point and at some dosage, human beings must be involved as test objects? The "poison

squads" of the early days of the Pure Food and Drug Act served a purpose. I assume that, in these days of stringent regulations regarding human experimentation, this may be considered as an unthinkable thought. Perhaps we should start thinking a lot of unthinkable thoughts about the world, about ourselves, and even about pesticides!

In this connection, human repellents added to noxious agents may yield a margin of safety, if we employ the skunk principle. Sugar-coated medicines for children are now considered a hazard. We add identifying smells to heating gas. A bit of mercaptan added to widely used pesticides may well be desirable to limit their use indoors and their concentration levels elsewhere.

I shall not deal with research in biochemistry, molecular biology, and other areas at present considered to be basic and sophisticated. Of course, they are worthwhile, but the consequences of their findings are harder to predict. Biochemical and physiological studies on insects and their behavior may well yield vulnerable, exploitable targets. However, insect control by sterilization of the males, by x-rays or by chemicals, somehow eludes me as being a practical approach, despite its intriguing Freudian undertones. However, it seems desirable to explore physical energy, such as ultrasound, or the spectrum in the range invisible to the human eye, or radar or laser beams, for the control of spaces from insects and other animals.

I detect considerable emphasis on the epidemiologic approach to the problem. Having a vested interest in this field, I am naturally in favor of this, yet I cannot be impressed by the potential of prospective studies on undefined heterologous populations, without quantitative determinations of exposure, without well-defined controls, and really without clear indication of what we seek. Through animal studies, and then through more precisely designed case-control studies, the derivation of some hypotheses would make the approaches more rewarding. The anticipation that, by gathering sufficient data, much of it quite "dirty," something will turn up is remote, even if we use computers. The background noise in such approaches usually defeats even this hope. Science is a rapier, not a blunderbuss.

Careful, detailed studies on high-exposure groups, industrial and otherwise, along with some parallel controls, are very much worthwhile. Case-control, or retrospective search for associations of exposure (if it can be measured) and disease occurrence, also seem worthy. Surveillance data on evidence of exposure, at least to agents that are retained by the body, certainly require attention, with careful selection of sample populations rather than an attempt to make such determinations all-inclusive. In this connection, I wonder whether the use of the most readily available fresh human tissue, the placenta, has had adequate consideration.

I would urge a thoughtful reassessment of "population laboratories" or general prospective population studies, not only for the predictable value of the data thus obtained, but also as to its priority at this stage of our knowledge.

I wish to return to the pivotal thought that pesticides and their many relatives are but one aspect of pollution of our environment, man-made and natural. The latter is most appropriate to include at this point, for we have again become acutely aware that powerful hepatotoxins and carcinogens are manufactured by certain fungi, as well as by man. For the control of this situation, dry, cool storage of high-protein foods seems more attractive than fungicides.

We are here to consider pesticides, of course, but we would fulfill our role neither as scientists nor as citizens were we to neglect their relationship to the

totality of our environmental problem. And for this, we must return to Rachel Carson and to Ralph Nader – and *Uncle Tom's Cabin* is still with us, also.

At what point do we translate our research conclusions into action that might resolve some of our questions and not only rephrase them? What mechanisms and resources do we need to make such actions possible?

I would submit that three elements are essential for this grave national problem of environmental pollution. First, an aroused, informed public. Second, a national policy at our highest level, with teeth in it. Third, technological personnel and resources to carry out the policies, at regional and at national levels. These three elements must develop in tandem, in a meaningful and dynamic equilibrium.

For the first, perhaps some of our national voluntary agencies concerned with rare diseases could be persuaded to realign their interests. Where are the citizen groups for a clean environment? Second, our gathering here is representative of the lack of political policy power we have, but which must be involved. It is true that we now have a Division of Environmental Health Sciences in the National Institutes of Health of the Department of Health, Education, and Welfare. However, water resources are now again under the Department of the Interior. The air pollution program is fractionated. Housing is a concern of a new department; transportation, industry, and agriculture of still others. The Food and Drug Administration, with its new dentures, has circumscribed authority. Further fractionation of responsibility, with low-level interdepartmental committees, certainly cannot serve as an adequate mechanism. Instead, has not the time come, if it is not overdue, to establish an equivalent of the National Security Council, a National Environmental Council at the cabinet level? Concurrently, we would need a Joint Congressional Committee on Environment.

We are met under the threat of mushroom clouds; under the tragic pall of Viet Nam; under the pressure of explosion of world populations; and under the millennial issues of man's relations with man. Yet with all this, our environment also may become as grave a danger. We must do something about it. Let us remember, too, so that some day we may join David in his psalm, "Lord, I have loved the habitation of Thy house, and the place where Thine honor dwelleth."

[Cite: 6 *Fd. & Cosmet. Toxicol* 209 (1968)]

Pesticide Concentrations in the Liver, Brain and Adipose Tissue of Terminal Hospital Patients*

(J. L. Radomski, W. B. Duchmann and E. E. Clizer, with the assistance of A. Rey)

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(Received 26 January 1968)

Abstract—Organochlorine pesticide concentrations have been determined at autopsy in the fat and liver of 271 patients previously exhibiting various pathological states of the liver, brain and other tissues of the body. These levels were compared with pesticide concentrations observed during an earlier study in random autopsy cases. Comparisons were also made with a general group designated "Infectious diseases", containing a variety of conditions of proven aetiology. There was a striking lack of correlation between pesticide concentrations in the liver and in the fat of all autopsy cases, but there was a significant correlation between pesticide levels in the brain and in the fat. No elevation of pesticide concentrations was observed in the presence of brain tumours, but a significant increase of the mean *p,p'*-DDE concentration was found in encephalomalacia and cerebral haemorrhage. Significantly elevated fat concentrations of *p,p'*-DDE and dieldrin were found in portal cirrhosis, but not in the presence of fatty metamorphosis. Highly significant elevations of pesticide concentration were present in cases of carcinoma of various tissues. Fat concentrations of *p,p'*-DDT, *p,p'*-DDE, *p,p'*-DDD and dieldrin were consistently and significantly elevated in cases of hypertension. An investigation of the home usage of pesticides by these individuals led to the highly significant observation that individuals using pesticides extensively in the home had levels of *p,p'*-DDT and its metabolite *p,p'*-DDE three to four times higher than had those who used minimal quantities. No correlation was found between pesticide levels in the fat and length of hospitalization or loss of body weight.

INTRODUCTION

Extensive animal experimentation has shown that chronic exposure to the chlorinated hydrocarbon pesticides produces liver damage. In addition, acute and chronic exposure to these substances, particularly aldrin and dieldrin, have been shown to affect the central nervous system. If humans are developing liver or neurological disease due to excessive exposure to pesticides, then it would seem reasonable to assume that those so affected would bear higher concentrations of pesticides than normal. We therefore set out to compare the pesticide concentrations present in the tissues taken at autopsy following deaths from liver and brain disease at Jackson Memorial Hospital with the samples obtained previously from the general population (Fiserova-Bergerova, Radomski, Davies & Davis, 1967).

While we have found that certain disease conditions appear to be associated with elevated pesticide levels, we were more impressed by the great individual variability of pesticide levels found in this experiment, regardless of the disease category. This has confirmed the impression of marked variability which we observed before in the general population. Now, it is widely held that the diet or the food ingested is the major source of *p,p'*-DDT and presumably other chlorinated hydrocarbons found in the tissues of the general population. Since the presence of pesticides in the food supply of this nation is ubiquitous, it would seem that if food were the primary source of the pesticide body burden, there

*This investigation was supported by Public Health Service Contract No. PH 86–65–60 and Grant No. 2–POI—ES00052–3.

would be relatively little variability. The existence for no apparent reason, of widely divergent concentrations of pesticides in individuals, therefore, has caused us to question this premise.

While pesticide concentrations in food and water and the effects of environmental exposure to pesticides have been widely investigated, little attention has been paid to the possible hazardous effects of the home usage of pesticides (other than the danger of accidental poisoning) and to the contribution such usage might make to the pesticide body burden. In order to determine whether this unknown factor could be responsible for the very high levels of pesticides observed in certain individuals, a field investigation of the usage habits of as many cases as possible was conducted. These usage habits were then compared with the pesticide body burden.

EXPERIMENTAL

Selection of Cases.—From January 1964 to June 1967, inclusive, all autopsies at Jackson Memorial Hospital with a history of liver disease or brain or neurological disease were selected for this study. In addition, a group selected at random with normal livers and brains was collected. Samples (1–2 g) of liver, adipose tissue and brain were collected for chemical analysis. In addition, sections of all organs showing gross changes were subjected to histo-pathological examination. Each case was evaluated by consideration of the cause of death and the gross and histopathological tissue changes detected. All cases were classified according to the type of liver or neurological disease present without knowledge of the pesticide levels. In a few instances, cases were listed in more than one category because of the presence of significant multiple pathological changes.

Chemical analysis

Tissue analyses for pesticides were performed by modifications of the method of Radomski & Fiserova-Bergerova (1965).

Extraction procedures.—Interior portions of tissue specimens were used to eliminate the possible contamination of the outer surface. These were weighed on aluminum foil to an accuracy of ±5 mg and placed in a glass tissue-grinder (Duall Size C). Petroleum ether (Burdick and Jackson Laboratories, Muskegon, Michigan) was added, and the samples were homogenized. The homogenate was transferred to a calibrated, glass-stoppered, centrifuge tube. The homogenizer was rinsed, with grinding, with small amounts of petroleum ether which were used to adjust the final volume.

Adipose tissue.—Adipose tissue (200 mg) was ground and extracted with 10 ml petroleum ether, and 2 μl of extract was usually injected into the gas chromatograph. As the concentration of *p,p'*-DDE was generally much higher than the concentration of other pesticides, it was usually necessary to make a 1 : 10 dilution to determine this metabolite.

Liver.—A portion of tissue (250 mg) was ground with 3·0 ml petroleum ether. During the grinding, approximately 2 g sodium sulphate was added. The petroleum ether extract was transferred quantitatively to a graduated centrifuge tube using small quantities of petroleum ether. The final volume was adjusted to 5 ml, and 2 μl of extract was usually injected (occasionally 5 μl, when no excessive interferences were present).

Brain.—Brain tissue (250 mg) was dried in a desiccator over silica gel for a minimum of 2 days before grinding with a total of 5 ml petroleum ether. The samples were then centrifuged, and 2 μl of extract was injected.

Column preparation.—QF–1 (fluorosilicone fluid–Dow Corning FS–1265, 1·25 g) or Dow 200 (Dow Corning silicone fluid 200-12500 CSP, 2·5 g) was dissolved in 150 ml ethyl acetate and added to 25 g Chromosorb W, DMCS-treated, acid-washed, high performance, 80–100 mesh (Johns-Manville) in a fluted round-bottom 1-l flask. After the suspension had been shaken for 20 min, the ethyl acetate was evaporated in a flash evaporator. The columns were packed in 0·25 in. glass tubing, 3 ft long for Dow 200 and 6 ft long for QF-1. After packing the columns were conditioned for 48 hr at 215°C with a low carrier-gas flow rate (pre-purified nitrogen, Matheson, Coleman and Bell).

Gas chromatography.—The Micro Tek G.C. 2000MF with a tritium electron capture detector was used for all experiments. Conditions were as follows:—Temperatures: inlet 210°C, column 185°C, detector 195°C; nitrogen pressure:

input 70 psig; flow rate of nitrogen: 60–70 ml/min; polarizing voltage: 15 V d.c. On-column injections with Hamilton 10-μl syringes were utilized. Dilutions were made, however, when the peaks were too high for recording.

Field studies

A former medical student questioned the next of kin, whenever possible, regarding (1) age, sex and race of the deceased, (2) length of sickness and loss of weight before hospitalization, (3) duration of stay in the hospital, (4) loss of weight in the hospital before death, (5) nutrition, (6) occupation, (7) employer, (8) hobbies, and (9) general usage of chemicals, sprays, pesticides or insecticides. On the basis of information secured, each case was classified with regard to extend of pesticide exposure, as a heavy pesticide user (Group I), one who used pesticides very little or not at all (Group III) or one whose pesticide usage was considered normal, moderate or average (Group II). The patients were also categorized according to their loss of body weight. These judgements were made without knowledge of the tissue pesticide levels.

Statistical analyses

Several procedures were applied to these data. The medians of all experimental groups were computed as well as the percentages of cases above the median of control groups. The significance of the percentage of cases above the control median was computed. In addition, rank tests were done to assess the existence of significant differences between the various experimental groups and the control groups, and correlation studies were conducted of the relationship between pesticide levels in the various tissues analysed. Means and standard deviations of the means were also computed.

RESULTS

Originally, it was our intention to collect tissues from three types of case namely those with liver disease, those with brain or neurological disease and a third group of cases made up of a random selection of patients not believed to have suffered from either brain or liver disease. During the examination of these cases prior to final classification, it was discovered that many individuals believed to have had liver disease before autopsy, showed only, for instance, chronic passive congestion secondary to myocardial infarction. A large group of cases in the random group was also found to have diseases such as atherosclerosis and hypertension as well as various malignant diseases. All cases were therefore reclassified taking into account the postmortem findings. When it was discovered that there were groups of cases with atherosclerosis, malignancies, hypertension and leukaemia, it was decided that perhaps additional information could be gleaned from this investigation if these cases were evaluated as individual experimental groups.

Liver diseases

Pesticide concentrations in fat and liver tissue from patients dying with liver disease are listed in Table 1.

Portal cirrhosis.—All of the cases in this group had typical alcoholic (nutritional or Laennec's) cirrhosis of the liver. Mean levels of *p,p'*-DDE and dieldrin in the body fat were significantly higher than those of the normal population ($0.01>P$ 0.001 and $P<0.001$, respectively). Mean *p,p'*-DDT levels were also approximately double those of the normal population, but because of a high degree of variability, the observation was not significant ($P=0.18$). Levels of *p,p'*-DDE, *p,p'*-DDT, and dieldrin were all significantly elevated in the liver tissue itself, but *p,p'*-DDD levels in the liver were lower than normal. *p,p'*-DDD is a metabolite of *p,p'*-DDT which originates in the liver. Impaired function would presumably lower the rate of this metabolic conversion.

Fatty metamorphosis.—Included in the group were cases in which fatty metamorphosis (or infiltration) of the liver was present without necrosis or cirrhosis. Pesticide levels in both fat and liver tissue were essentially normal.

Metastatic liver disease.—The most striking elevations in pesticide concentration were observed in the rather large series of cases of metastatic malignancy of the liver. The mean *p,p'*-DDE concentration in the fat was three times as high as normal ($P=0.005$), and seven times as high as normal in the liver tissue itself ($P=0.001$). *p,p'*-DDT concentrations were also elevated in the fat but, surprisingly, not in the liver tissue. Dieldrin and *p,p'*-DDD concentrations, on the other hand, were essentially normal. These would appear to be fairly specific

alterations which probably have some real, but at the moment, obscure meaning. It does not seem likely that these altered concentrations were related to increased fat content of the liver, for in this case, consistent increases should have been observed.

Primary malignancy (hepatoma).—One of our initial primary interests in carrying out this study was a possible relationship between chlorinated hydrocarbon pesticides and tumours of the liver. Unfortunately, only a small number of primary liver-tumour cases were obtained. Three of the four cases had rather normal *p,p'*-DDE, *p,p'*-DDD, *p,p'*-DDT and dieldrin concentrations. The fourth case had 35.04 ppm of *p,p'*-DDE in the fat and 1.25 ppm in the liver. All four cases had abnoramlly high levels of β-BIIC in liver and adipose tissue, however, when compared to the infectious disease control group.

Post-necrotic cirrhosis.—This pathological entity was characterized, in contrast to portal cirrhosis, by the occurence of essentially normal pesticide concentrations, frequently lower than normal.

Other pathologial states of the liver.—Most noteworthy was one case of ideopathic amyloidosis which had markedly elevated levels of all the pesticides measured. A concentration of 50.8 ppm of *p,p'*-DDE in the fat was observed. This was one of the highest levels of *p,p'*-DDE observed in this study.

Brain and neurological diseases

Pesticide concentrations in fat and brain tissue from patients dying from disease of the brain or nervous system are listed in Table 2.

TABLE 1.—PESTICIDE CONCENTRATIONS IN THE FAT AND LIVER TISSUE OF PATIENTS TERMINATING WITH LIVER DISEASE

Diagnosis	Number of cases	Tissue	Level of pesticide (ppm±SD)					
			p,p'-DDE	*p,p'*-DDD	*p,p'*-DDT	Dieldrin	B-BHC	Heptachlor epoxide
Normal	42	Fat	6·69± 4·07	0·28±0·38	2·77±1·42	0·21±0·15		
		Liver	0·35± 0·01	0·36±0·03	0·10±0·02	0·03±0·03		
Infectious diseases	20	Fat	8·89± 7·67	0·12±0·27	3·92±5·01	0·38±0·23	0·66±0·23	0·28±0·16
Portal cirrhosis	33	Fat	11·49± 7·46	0·34±0·42	5·19±5·97	0·50±0·36	0·76±0·50	0·33±0·21
		Liver	1·19± 0·90	0·20±0·25	0·53±0·14	0·10±0·19	0·12±0·18	0·05±0·09
Fatty metamorphosis	14	Fat	7·12± 4·61	0·27±0·19	3·53±3·20	0·35±0·15	0·51±0·37	0·22±0·14
		Liver	0·63± 0·45	0·15±0·18	0·05±0·15	0·04±0·09	0·10±0·18	0·03±0·09
Malignancy, metastatic	30	Fat	19·27± 6·35	0·37±0·51	5·87±6·32	0·49±0·37	0·82±0·48	0·27±0·44
		Liver	2·44± 9·16	0·22±0·37	0·08±0·13	0·07±0·07	0·10±0·20	0·03±0·04
Malignancy, primary	4	Fat	13·58±14·44	0·49	7·70±8·00	0·36±0·17	1·06	0·23
		Liver	0·60	0·16	0·02	0·03	0·07	0·02
Acute necrosis	9	Fat	9·51±11·37	0·65±0·15	5·84±1·17	0·36±0·25	0·58±0·48	0·31±0·19
		Liver	1·32± 0·28	0·40±0·10	0·35±0·11	0·03±0·04	0·06±0·10	0·03±0·07
Toxic hepatitis	2	Fat	14·36± 3·90	0·21	4·64±3·87	0·36±0·11	0·86	0·34
		Liver	0·65	0·14	0·44	0·03	0·12	0·04
Adenocarcinoma of bile ducts	2	Fat	10·45± 7·42	0·82	3·68±7·42	0·21±0·03	0·61	0·34
		Liver	0·35	0·14	0·00	0·03	0·07	tr.
Amyloidosis	1	Fat	50·80± 7·42	1·84			2·28	1·12
		Liver	4·39	0·14	0·50	tr.	0·11	tr.
Post-necrotic cirrhosis	4	Fat	6·90± 4·35	0·07	1·53±1·83	0·21±0·16	0·75	0·27
		Liver	0·29	0·08	tr.	0·03	0·06	0·01

TABLE 2.—PESTICIDE CONCENTRATIONS IN THE FAT AND BRAIN TISSUE OF PATIENTS TERMINATING WITH BRAIN DISEASE

Diagnosis	Number of cases	Tissue	Level of pesticide (ppm±SD)					
			p,p'-DDE	*p,p'*-DDD	*p,p'*-DDT	Dieldrin	β-BHC	Heptachlor epoxide
Normal	42	Fat	6·69± 4·07	0·28±0·38	2·77±1·42	0·21±0·15		
		Brain	0·12± 0·19		0·04±0·01	0·04±0·01		
Infectious diseases	20	Fat	8·89± 7·67	0·12±0·27	3·92±5·01	0·38±0·23	0·66±0·2	0·28±0·16
Ischaemic necrosis	3	---do	6·22± 5·67	0·00	2·28±2·38	0·67±0·63	0·52	0·28
		Brain	0·14	0·00	0·00	0·02	0·00	0·00
Encephalomalacia	24	Fat	12·63±11·43	0·27±0·19	5·40±8·45	0·50±0·33	0·75±0·34	0·35±0·16
		Brain	0·20± 0·18	0·00	0·00	0·01±0·01	0·00	0·00
Cerebral hemorrhage	16	Fat	12·20± 7·36	0·38±0·38	3·92±2·45	0·59±0·48	0·70±0·36	0·41±0·30
		Brain	0·10± 0·11	0·00	0·00	0·01±0·02	0·00	0·00
Brain tumor	6	Fat	7·33± 8·17	0·27±0·47	3·91±3·93	0·32±0 25	0·46±0·23	0·34±0·29
		Brain	0·08± 0·06	0·01±0·03	0·01 ±0·02	0·02±0·02	0·00	0·01±0·01
Degenerative changes	10	Fat	10·44± 7·64	0·28±0·70	2·00±1·60	0·30±0·17	0·59±0·35	0·29±0·16
		Brain	0·16± 0·3	0·00	0·01±0.02	0·02±0·02	0·00	0·00
Brain, metastatic tumor	1	Fat	0·00	0·00	0·00	0·00	0·00	0·00
		Brain	0·07	0·00	0·00	tr.	tr.	0·00
Granulomatous encephalitis	1	Fat	6·60± 7·64	tr.	2·10	0·41	0·88	0·42
		Brain	0·14	0·00	0·00	tr.	0·00	0·00
Personality changes	1	Fat	3·66± 7·64	0·32	2·80	0·38	0·37	0·16
		Brain	tr.	0·00	0·00	tr.	tr.	0·00

Encephalomalacia.—Significant elevations of the *p,p'*-DDE concentration in the fat ($0.01>P>0.001$) as well as the brain tissue ($0.05>P>0.01$) were observed. Strangely, while there was a highly significant elevation of the dieldrin concentration in the fat ($P<0.01$), brain concentrations were, if anything, lower than normal. *p,p'*-DDT levels were elevated, but not significantly ($P=0.1$), in the fat, but were lower than normal in the brain tissue.

In this category were included all cases of definite encephalomalacia, either old or recent. Patients in this category were, of course, invariably aged, and atherosclerosis and myocardial infarcts were also commonly present.

Cerebral haemorrhage.—Cases where there was distinct evidence of haemorrhage, either old or recent, were included in this group. *p,p'*-DDE and dieldrin levels were significantly elevated in the fat ($0.015>P>0.01$, respectively), but were essentially normal in the brain tissue.

Cerebral degeneration.—Pesticide concentrations in fat and brain were essentially normal. A small elevation of the mean *p,p'*-DDE level in the fat was observed ($0.3>P>0.2$).

Included in this group were all cases of degeneration of the central nervous system cells, where strokes or haemorrhage had not occurred. Degeneration was frequently of the diffuse or Alzheimer type.

Brain tumour.—One of the initial major interests of this investigation was the possibility that chlorinated hydrocarbon pesticides might produce tumours of the brain. Primary brain tumours are rare and only four cases were found in this study. It is, of course, hard to justify the drawing of a conclusion on the basis of four cases, but the fact that normal pesticide levels were observed in both fat and brain tissue would seeem to suggest that chlorinated hydrocarbon pesticides are not involved in the development of brain tumours.

Other neurological diseases.—Pesticide levels in other neurological diseases observed in the study were not remarkable. In three case of ischaemic necrosis, pesticide levels were normal with the exception of elevated levels of dieldrin in the fat ($P=0.33$).

Miscellaneous diseases

Results of pesticide analyses carried out on the adipose tissue of patients with various other terminal conditions are given in Table 3.

TABLE 3.—PESTICIDE CONCENTRATIONS IN THE FAT TISSUE OF PATIENTS WITH VARIOUS TERMINAL CONDITIONS

Diagnosis	Number of cases	Level of pesticide (ppm±SD)					
		p,p'-DDE	p,p'-DDD	p,p'-DDT	Dieldrin	β-BHC	Heptachlor epoxide
Normal	42	6·69± 4·07	0·28±0·38	2·77±1·42	0·21±0·15		
Infectious diseases	20	8·89± 7·67	0·12±0·27	3·94±5·01	0·38±0·23	0·66±0·23	0·28±0·16
Atherosclerosis	54	12·01± 2·53	0·27±0·75	5·10±7·57	0·37±0·23	0·76±0·52	0·33±0·17
Hypertension	8	17·91± 6·28	0·40±0·42	6·54±3·64	0·73±0·59	0·95±0·56	0·48±0·37
Carcinoma	40	15·97± 3·78	0·34±0·51	5·65±5·61	0·55±0·34	0·78±0·43	0·34±0·24
Leukemia	5	16·10± 5·53	0·58±0·45	4·69±4·28	0·47±0·22	0·77±0·58	0·32±0·23
Chronic renal disease	8	8·11± 4·25	0·21±0·25	2·11±1·10	0·23±0·16	0·42±0·63	0·21±0·11
Pancreatitis	3	11·57±10·81	0·09	1·29±1·05	0·40±0·35	0·56	0·32
Hodgkin's disease	5	10·06± 4·43	0·38±0·27	3·22±1·20	0·51±0·18	0·57±0·22	0·30±0·06

Atherosclerosis.—In addition to atherosclerosis, most of these cases had arteriosclerosis; myocardial infarcts were also commonly present and were frequently the cause of termination. Chronic passive congestion of the liver secondary to the cardiovascular failure following myocardial infarction was frequently present, causing many of these to be classified originally in the liver-disease category. Moderately elevated levels of *p,p'*DDE, *p,p'*-DDT and dieldrin were observed in the fat of many of these cases. However, mean pesticide concentrations were not significantly different from those of the normal population.

Hypertension.—Although only eight cases of essential hypertension were contained in this study, more consistent elevations of pesticide concentrations in the fat were observed in this group than in any other disease category. Concentrations ranging from two to four times the normal of *p,p'*-DDE, dieldrin, *p,p'*DDD and *p,p'*-DDT were observed in all eight cases. This seems to be one of the most significant observations of the experiment since it is difficult to postulate depressed liver function as a possible explanation.

Carcinoma.—Included in this group were carcinomas of the lungs, stomach, rectum, pancreas, prostate and bladder. Concentrations of all the pesticides were remarkably high, averaging two or three times the normal concentration. Before grouping all of these various types of carcinoma together, each type was analysed individually in an attempt to discover whether the elevated levels were associated with a particular neoplastic disease. However, no such association could be discerned.

Chronic renal disease.—Eight cases of chronic renal disease were studied. The usual pathological diagnosis was chronic glomerular nephritis. It is noteworthy that pesticide levels were, if anything, somewhat lower than normal in this group, suggesting (1) that chlorinated hydrocarbon pesticides are probably not involved in the production of this disease condition, and (2) that chronically impaired renal function does not lead to elevated levels of pesticides in the fat.

Correlation of pesticide concentrations in adipose tissue with those of liver tissue and brain tissue

As part of our statistical analysis of the data of this experiment, the correlation of pesticide concentrations in fat with those in liver tissue and with those in brain tissue was studied. Contrary to our expectations, virtually no correlation was observed between the fat and liver concentrations of any of the pesticides measured. On the other hand, fat concentrations of pesticides are correlated with pesticide concentrations in the brain.

When similar correlation studies were performed on our data from the general population, correlation was observed between liver and fat concentrations of *p,p'*-DDT and its metabolite. It would therefore appear that the lack of correlation between pesticide concentrations in liver and fat was associated with the presence of disease.

The relationship of pesticide levels to the home usage of pesticides

In the examination of these data, the most striking observation is the widely varying difference that exists in pesticide levels in individuals, some having very high and others very low pesticide levels. Hospital records indicated no occupational exposure to pesticides in this study. Therefore, it was considerd that perhaps these remarkable discrepancies could be related to the home usage of pesticides.

The data obtained by interviewing the next-of-kin of these cases revealed that there was indeed a relationship. This was most striking with the insecticide *p,p'*DDT and its principal metabolite, *p,p'*–DDE. The mean *p,p'*–DDT concentration in the high exposure group is over four times the mean *p,p'*–DDT concentration in the low exposure group (P 0·001), while the mean *p,p'*–DDE concentration is almost three times greater in the high exposure group than in the low exposure group. In the case of dieldrin and heptachlor epoxide, there were no significant differences in mean pesticide levels between the three exposure groups, *p'*–BHC showed a significant increase (P 0·01) from Exposure Group I to Group II but not between Groups II and III. These striking results clearly indicate that the home usage of pesticides is one, if not the major, factor in the occurrence of elevated pesticide body levels of *p,p'*–DDT and its metalolites. Similar results with dieldrin and hepachlor epoxide would not be expected since these pesticides are not normally present in pesticide mixtures intended for home usage.

It also occurred to us that all the cases in this study were patients with terminal disease and terminal patients frequently become extremely emaciated. Possibly the high pesticide levels observed were related to loss of fat in the adipose tissue, resulting in a higher concentration of pesticides in the remaining fat. However, when the loss of body weight was compared to pesticide concentrations, no such relationship was observed.

DISCUSSION

It is generally recognized that the present attempt to discover whether the current, long-term, low-level exposure to pesticides experienced by the general population in this country is producing harmful effects is beset with monumental difficulties. The ubiquitous distribution of large numbers of compounds and the lack of adequate controls are serious handicaps. Many possible approaches have been suggested and some have been tried; all have serious deficiencies. Certainly,

new approaches are needed. One such approach is the evaluation of pesticide levels in the presence of diseases possibly caused by pesticides. The present experiment was conceived as a pilot study designed to test the value of this approach. It was recognized at the outset that the interpretation of the results obtained would be difficult. When a correlation is established between a given disease and a particular pesticide body burden, three possibilities need to be considered. Either the disease is responsibl for the pesticide body burden or *vice versa*, or both result from some other factor. There is no evidence in the litrtature that a diseased liver may cause an levation in pesticide levl in th adipose tissue. However, such a possibility distinctly exists. Although experiments can readily be edsigned in animals to determine whether liver damage may result in elevated pesticide levels, it is doubtful whther this possibility has yt been investigated.

The most convincing relationship between pesticide concentration and disease revealed in this study was found in the consistently high concentrations present in patients with cirrhosis of the liver, carcinoma, and hypertension. Before any conclusions can be drawn on the role of excessive pesticide exposure in the production of any of these diseased states, confirmation of these preliminary observations is essential. The following step would consist of experiments designed to determine whether the disease caused the elevated pesticide level or *vice versa*.

The question was raised as to whether factors associated with the hospitalization were responsible for these elevated levels. No correlation was found between the elevated pesticide levels and the length of stay in hospital or with inanition.

The statement is commonly made that the major source of pesticide body burden of individuals in the general population is the food intake, quantities taken in via water and air being considered negligible. While it has been repeatedly demonstrated that occupational exposure to pesticides is capable of producing elevated body levels, the role of the nonoccupational home usage of pesticides in the production of pesticide storage in the body has not been considered significant. Minute quantities of pesticides are present in all types of foods, however, and it is difficult to imagine one individual ingesting much more pesticide than another. Of course, individual differences do exist in the ability to metabolize and excrete pesticides. However, with regard to the degree of individual use of pesticides, it has been our observation that there seem to be two types of individuals, those who abhor insects and are ignorant and contemptuous of the hazards of chemical intoxication, and those with an instinctive, exaggerated fear of chemical exposure. It is conceivable that there could be a hundred-fold difference in the exposure of these two types of people.

This experiment suggests that the household use of pesticides may be responsible for the accumulation of elevated body levels of these compounds. Actually, this experiment—complicated by the presence of disease and death of the patient—did not provide the optimum conditions for the evaluation of this factor. A similar study of the correlation between home usage of pesticides and body burden in random cases of accidental death would be more suitable. A second approach, perhaps even more valuable, would be the determination of blood levels in individuals who use pesticides in house and garden.

Exposure of rats to *p,p'*-DDT is known to produce elevation of liver microsomal-enzyme activity. Schwabe (1964) and Gerboth & Schwabe (1964) have shown that phenobarbitone-induced sleeping time was reduced by approximately 50% by the feeding of a level of *p,p'*-DDT which produced concentrations of 10–15 ppm total DDT (including metabolite) in the fat. These data applied to this investigation would mean that a high percentage of the patients in this study probably exhibited enhancement of microsomal-enzyme activity which may have modified their response to drugs. Of course, there is as yet no evidence that these rat data are quantitatively applicable to man, nor that significant microsomal stimulation by pesticides occurs in man.

No attempt has been made to correct the concentrations of pesticides in the liver for the fat content of this organ. Many of the diseases encountered are characterized by fatty infiltration or degeneration of the liver. The possibility exists that elevated pesticide concentrations in the liver were wholly or partially a reflection of an increased fat content of this organ. One observation should be emphasized, namely, that elevated pesticide levels were not observed in the presence of fatty metamorphosis of the liver. It should also be noted that the major conclusions of this investigation are based on the concentration of pesticides in adipose tissue: not on the concentrations in liver or brain.

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[Excerpt from THE JOURNAL OF THE NATIONAL CANCER INSTITUTE, June 1969]

Bioassay of Pesticides and Industrial Chemicals for Tumorigenicity in Mice: A Preliminary Note [1, 2, 3]

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SUMMARY—The tumorigenicity of selected pesticides and industrial compounds was tested by continuous oral administration to both sexes of two hybrid strains of mice, started at the age of 7 days. Maximal tolerated doses were given. Administration of 11 of the 120 test compounds induced a significantly elevated incidence of tumors, mostly hepatomas; this incidence was comparable to the mean tumor incidence of a group of positive control compounds. The 11 compounds include 5 insecticides: *p,p'*DDT, Mirex, bis(2-chloroethyl)ether, Chlorobenzilate, and Strobane; the 5 fungicides PCNB, Avadex, Ethyl selenac, ethylene thiourea, and bis(2-hydroxyethyl)dithiocarbamic acid potassium salt; and the herbicide *N*-(hydroxethyl)hydrazine. Eighty-nine compounds gave no significant indication of tumorigenicity after oral administration. The results with the remaining 20 compounds require further evaluation. The possible relevance of these experiments to human exposure is discussed.—J Nat Cancer Inst 42: 1101-1114, 1969.

THE ENVIRONMENT of man contains an increasing number of synthetic chemicals which may be hazardous and which require testing for toxicity and tumorigenicity. This is a preliminary report of a large-scale study designed to screen selected pesticides and industrial compounds for tumorigenicity in mice. The results were considered to be of sufficient interest to warrant publication of certain portions of the study at this time. The complete experiment included bioassays on 130 compounds in two hybrid strains of mice by single subcutaneous injection or by continuous oral administration. Three of these compounds were

[1] Received April 29, 1969; accepted April 30, 1969.

[2] This study was performed at Bionetics Research Laboratories of Litton Industries under contract numbers PH43-64-57 and PH43-67-735 from the National Institutes of Health.

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[6] We thank A. M. Smith and D. G. Thomas for the computer programming of statistics and Drs. P. Kotin, C. G. Baker, U. Saffiotti, M. Schneiderman, and N. Mantel for helpful suggestions.

[7] National Institutes of Health, Public Health Service, U.S. Department of Health, Education, and Welfare.

tested only by subcutaneous injection; all others were tested by both routes. Among the compounds were 7 carcinogens included as positive controls (*1*), 104 pesticides, and 19 industrial chemicals. The compounds were selected for inclusion in the study on the basis of three criteria: *a*) evidence of toxicity described in the literature suggesting potential hazards to man, *b*) widespread use of the chemicals, or *c*) chemical structure suggesting possible carcinogenicity. Even though nearly 20,000 mice were used in these studies, the several investigations were done as preliminary, probing experiments and were not expected to provide final definitive information on every compound.

This initial report is motivated by extensive exposure of man to some of the compounds tested and is focused on the data of greatest public health significance. Thus, *only the results of oral administration are considered here.* Evaluation of these data revealed that 11 compounds are clearly tumorigenic for the strains of mice used at the high dose levels administered. The results for another group of 20 compounds are still inconclusive and require further evaluation. Eighty-nine compounds did not give significant indication of tumorigenicity. A full account of the study will be published later.

MATERIALS AND METHODS

Animals and housing.—"Specific pathogen-free" mice were obtained from Cumberland View Farms, Clinton, Tennessee, to establish a breeding colony. Females of the C57BL/6 strain were mated with C3H/Anf or AKR males to obtain the two F_1 hybrid stocks used. The (C57BL/6 × C3H/Anf)F_1 mice are herein designated as "strain X" and the (C57BL/6 × AKR)F_1 as "strain Y." Mice were kept in facilities having separate clean and dirty corridors with unidirectional airflow from the clean to the dirty corridor. Animal attendants wore sterile gowns, masks, gloves, and shoe covers.

Chemicals, dose determination, and administration.—Chemicals were obtained from commercial sources. Their composition was confirmed by infrared spectroscopy, gas chromatography, or thin-layer chromatography. The chemicals were administered to the mice without further purification. Three chemicals were tested in the form of two different commercial products (compounds 69 and 126, 93 and 128, 27 and 92).

The maximal tolerated doses were given. These levels were selected following a sequence of studies, during which the maximal levels resulting in zero mortality were determined for a single dose, then for 6 daily doses, and finally for 19 daily doses.

The maximal tolerated dose of each compound in mg/kg of body weight is shown in tables 1 to 4. For the tumorigenicity testing, this dose was given by stomach tube, beginning when the mice were 7 days of age, in a suspension of the vehicle indicated in these tables. The same absolute amount of each compound was given each day until the mice were 4 weeks old; the dose was not readjusted according to weight gain during this period. After the mice were weaned at 4 weeks of age, the chemicals were mixed directly with the diet, which was provided *ad libitum;* no vehicle was used. The concentration in the diet, listed as ppm in tables 1 to 4, was calculated according to the weight and food consumption of the 4-week-old mice so that once again they would receive approximately the maximal tolerated dose, which had been calculated according to mg/kg body weight. The same concentration was maintained throughout the observation period of approximately 18 months.

Distribution of animals.—At weaning, 18 mice of each sex of each strain were retained for study. Thus, 72 animals were given each compound orally. One exception to this was the positive control compound ethyl carbamate given to 24 mice of each sex of each strain. Six animals were kept in each cage. The animals on test with each compound were placed in one of four rooms. Each room contained an untreated control group, and one room contained an additional group given gelatin suspension during the period when compounds were administered by stomach tube. Each room also housed at least one positive control group.

Necropsy and diagnosis.—The experimental design called for necropsy at 18 months of age. The logistics of performing necropsies in a study involving almost 20,000 mice were complex, however, and the actual time of necropsy varied somewhat among the groups. These times are shown as the "Weeks at term" in tables 5 through 7. This range of termination times existed among the negative

and positive control groups as well as among the experimental groups.

The postmortem procedure included an external examination and a thorough examination of thoracic and abdominal cavities, with histologic examination of major organs and of all grossly visible lesions. The cranium was not dissected. Thyroid glands were examined and sectioned in mice treated with Amitrol and in one negative control group, but not in other groups. The entire carcass and all internal organs were fixed and have been saved. Blood smears were made on all mice before they were killed, and then examined only in cases showing splenomegaly or lymphadenopathy.

Statistical analysis.—Since several negative control groups differed with respect to their location within the four rooms, time of entry into the experiment, and length of time until necropsy, the variance among these groups was analyzed according to the incidence of hepatomas, pulmonary tumors, lymphomas, and total mice with tumors. The first test performed was the "chi-square test for heterogeneity of proportions after adjustment of stratification," as described by Armitage (*2*). The stratification in this application was the sex-strain combination. This test was not significant at the 5% level with any of the four categories of tumors. Similar ordinary chi-square tests were done on each sex-strain category, and no significant differences were found. As a final analysis of the negative control groups, the proportions of the various tumors among mice were regressed on the average time until death (*3*). This was done with each sex-strain combination for each type of tumor. In only 1 of the 16 such analyses was a significant positive relationship noted: the liver tumors among strain Y males. Among the males of strain Y, 3 of the 5 hepatomas seen were in the one group OD; this group also had the greatest age at death, 89 weeks (table 5). However, for liver tumors of strain X, there was a negative correlation between the incidence of hepatomas and the age at term. In both these cases, the figures are based on a very small number of hepatomas. Thus, the conclusion was reached from the several analyses performed that there was no significant evidence of differences among the negative control groups. In subsequent comparisons with positive controls and experimental compounds, the 5 negative control groups were lumped together.

The individual positive controls and experimental groups were compared with the grouped negative controls. The analysis presents the corrected relative risk (*4*) for each comparison. The relative risk is a measure of the tumor incidence among the treated mice as compared to the controls. The analysis was performed with four tumor groupings: hepatomas, pulmonary tumors, lymphomas, and total mice with tumors. The significance test of each sex-strain subgroup and their various combinations are by the Mantel-Haenszel procedure (*5*), and the combined relative risk uses the weighted geometric mean (*6*) with the 1/2 corrections used throughout (*7*, *8*).

As an additional test to compare the tumor incidence of mice treated with experimental compounds with those treated with positive control compounds, the 7 positive controls were lumped together and the corrected relative risk was calculated for each experimental group compared to this baseline. This was done to give an approximate figure with which the tumorigenicity of experimental compounds could be compared. This type of calculation should not be used as a rigid line of demarcation between tumorigenic and nontumorigenic compounds.

TABLE 10.—Relative risk for development of tumors among mice treated with experimental compounds when compared with total positive controls

Compounds	Compound No.	Strain*	Mice with hepatomas			Total mice with tumors		
			M	F	Sum	M	F	Sum
PCNB	60	X	.111	.331	.215	.198	.179	.188
		Y	1.871	.163	1.005	1.281	.097	.515
		Sum	.705	.268	.466	.519	.142	.297
p,p'-DDT	65	X	1.126	.331	.658	.744	.179	.383
		Y	.872	.154	.566	.586	.391	.481
		Sum	.991	.264	.617	.658	.272	.431
Mirex	96	X	.382	1.067	.638	.316	.439	.371
		Y	.700	2.900	1.465	.379	.969	.618
		Sum	.506	1.730	.945	.344	.646	.472
Avadex	98	X	2.832	.277	.885	2.813	.210	.560
		Y	1.651	.186	.975	1.393	.111	.585
		Sum	2.032	.242	.930	1.775	.165	.573
Bis(2-chloroethyl) ether	109	X	4.259	.331	.902	Inf.†	.136	.260
		Y	1.494	0	1.029	1.014	.051	.473
		Sum	2.127	.256	.958	1.376	.101	.371
Ethyl selenac	129	X	1.412	.258	.705	3.201	.248	.622
		Y	.323	0	.242	.319	.200	.256
		Sum	.773	.200	.498	.752	.225	.387
ETU	153	X	4.259	Inf.†	6.559	2.813	Inf.†	3.957
		Y	Inf.†	2.274	3.259	Inf.†	1.667	2.457
		Sum	6.851	3.174	4.239	4.366	2.289	2.997
N-(2-Hydroxyethyl)hydrazine	154	X	.657	.092	.399	.679	.067	.303
		Y	1.651	0	1.147	.895	.145	.443
		Sum	1.051	.079	.652	.784	.103	.371
Chlorobenzilate	168	X	.821	0	.569	.858	.067	.344
		Y	.955	0	.686	.648	.136	.348
		Sum	.884	0	.624	.741	.099	.346
Bis(2-hydroxyethyl)dithiocarbamic acid, potassium salt.	170	X	2.832	2.052	2.338	2.813	1.077	1.533
		Y	4.009	.433	1.453	2.172	.429	.884
		Sum	3.422	1.094	1.869	2.406	.663	1.127
Strobane	171	X	.136	0	.100	.550	.099	.265
		Y	2.049	0	1.368	1.110	0	.704
		Sum	.831	0	.540	.799	.075	.401

*Strain X = (C57BL/6 × C3H/Anf)F_1; strain Y = (C57BL/6 × AKR)F_1.
†Inf.—relative risk calculated as infinite.

RESULTS

The tumors were principally of the liver, lung, and lymphoid organs. Tumors of other organs were rare except in the case of two positive control compounds: Amitrol, which induced thyroid carcinomas in practically all the animals, and ethyl carbamate, which induced a substantial number of adenomas of the Harderian gland. Because of the rarity of other types of tumors, only those of the three principal organs affected are considered here. Other tumors are counted, however, in the column "Total mice with tumors" of the tables.

The diagnostic criteria for liver tumors were those described by Lemon (*9*). According to her criteria, liver tumors are diagnosed as "hepatomas" unless metastases are found; then they are designated as carcinomas. This distinction is not made

to indicate that those which do not metastasize are benign, but rather because the histologic appearance of tumors of the liver of the mouse is not a good guide to their behavior. Metastasizing hepatic cell tumors were rare in the present study. Thus, the tables in this manuscript and the statistical calculations include the two subclassifications grouped together as "hepatomas."

Pulmonary tumors consisted principally of adenomas, according to the criteria of Stewart (*10*). A few adenocarcinomas of the lung were noted, but because of their relative scarcity both types are considered together as "pulmonary tumors."

Tumors of the lymphoid organs were originally classified by the criteria of Dunn (*11*). Most were Type B reticulum-cell sarcomas. A smaller number of animals had malignant lymphomas associated with leukemia, while other types of lymphoma were rare. In a study designed to investigate the tumorigenicity of chemicals rather than the pathogenesis of tumor types, we believed it more meaningful to combine all these tumors into a single category, "lymphomas."

As indicated in tables 6 and 8, the tumorigenicity of the positive control compounds was manifest primarily through the induction of hepatomas. Isosafrole was only weakly tumorigenic. All other positive controls had an elevation of hepatomas significant at the 0.01 level in one or more of the sex-strain subgroups. Dihydrosafrole induced liver tumors only in male mice, and Aramite led to a significant increase in hepatomas only in the males of strain X. Only 3 of the 7 positive controls had a significant increase in pulmonary tumors, and only ethyl carbamate induced a significant yield of lymphomas.

The pattern of tumor types among experimental compounds was similar to that with positive control compounds. Thus, the major evidence for tumorigenicity by experimental compounds lies in the increased incidence of hepatomas (tables 7 and 9). For each of the 11 experimental compounds listed in table 9, the increased incidence of hepatomas was significant at the 0.01 level for the sum of both sexes and both strains, the sum of males of both strains, and for the males of at least one strain considered separately. Females were generally less affected than males, but several compounds induced hepatomas in them also. When the relative risk for hepatoma development among these 11 experimental compounds was compared with the overall risk in the positive controls (table 10), in 10 of them at least one sex-strain subgroup had a greater risk than the corresponding sex-strain subgroup of the combined positive controls. The remaining compound, Chlorobenzilate, had a relative risk approaching that of positive controls for males of both strains.

The incidence of tumors of the lung and lymphoid organs showed a less striking elevation than hepatomas. The incidence of lymphomas in some subgroups of mice treated with *p,p'*-DDT, Ethyl selenac, ETU, and Strobane and the incidence of pulmonary tumors among mice treated with Avadex were significantly increased over the negative controls. No tumors of the lung or lymphoid organs were seen in mice treated with Mirex—possibly because none of these mice lived 18 months. However, if Mirex were strongly carcinogenic to these organs, an effect would probably have been seen during the time the animals survived.

Mice treated with compounds listed in table 3 did not have a significant elevation of tumor incidence at the 0.01 level of any type of tumor in any sex-strain subgroup or combination of groups after oral administration. Mice treated with compounds listed in table 4 had an elevation of tumor incidence in an uncertain range; with these compounds, additional statistical evaluation and/or experimentation will be required before an interpretation can be made.

DISCUSSION

The interpretation of these data requires consideration of two questions: "What is the biologic behavior of mouse hepatomas?" and "What relevance do studies with a single, high dose level in one species have for evaluating the hazard of other dose levels in other species?"

Confusion arises from the fact that classical terminology of neoplastic disease suggests the term "hepatoma" refers to benign tumors, whereas a malignant tumor of the liver should be referred to as a "carcinoma." The opinion of Lemon (*9*) has already been quoted on the impossibility of making this distinction between benign and malignant liver tumors in the mouse. Andervont and Dunn

(*12*) reported the transplantability of mouse liver tumors. They found no correlation between transplantability and morphologic characteristics. Many transplantable tumors had cytologic characteristics so similar to normal liver that the distinction was difficult to make on microscopic observation. Gross observation appeared to be a more reliable criterion. Thus, the term "hepatoma" as used in this manuscript should not be considered as implying that these tumors are benign. Indeed, it seems more reasonable to conclude that the great majority had malignant potentiality.

The problem of species specificity for chemical carcinogens has been discussed by several investigators (*13–15*) and will not be detailed here. There are differences among species: Some may be susceptible to tumorigenesis by a given chemical and others may show relative or absolute resistance. At present, there is no way to predict whether man may be more or less susceptible than the mouse to the induction of tumors by the compounds reported here. An estimation of the extent of the hazard posed by these compounds should take into consideration other experiments performed in other laboratories. It should be stressed that the dose received by the mice was far in excess of that likely to be consumed by humans.

Another problem in interpretation lies in the fact that laboratory experiments are designed to test a single chemical and to prevent exposures to other chemicals as much as possible. The environment of man, on the other hand, contains a complex mixture of chemicals. The way in which these interact to either enhance or inhibit carcinogenicity is a complex, difficult problem that has not been sufficiently investigated.

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Man and DDT-Compounds *

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Environmental introduction

Hundreds of thousands metric tons of DDT are used annually in the whole world. Accurate statistics from all countries is not available. In 1966, 64,000 metric tons of DDT were manufactured alone in the United States, one third of which was used within the country. The average annual United States production during 1949–66 has been 58,000 metric tons. The overall trend during these years seems to have been an increasing production and a relative as well as absolute decreasing use within the United States (cf. Table 1 given in Stickel (1968) for the U.S. data).

The persistence of the DDT-compounds (DDT+DDE+DDD) is well recognized; however there have been no realistic appraisals of the global persistence. It might well be possible that the background contamination of DDT-compounds is increasing.

By codestillation with water (Acree et al. 1963, Bowman et al. 1964) and volatilization from soil (Harris and Lichtenstein 1961) organochlorine pesticides leave the originally assaulted area; the eventual result being world-wide distribution. DDT-compounds have been found to be transported by air over the Atlantic (Risebrough et al 1968 a); they have appeared in the Antarctic (Sladen et al. 1966, Tatton and Ruzicka 1967); and they are common constituents of rain (Tarrant and Tatton 1968).

From the data given by Tarrant and Tatton (1968) it can be estimated that about 35 metric tons organochlorine pesticides are precipitated annually on the British Isles, about half of which is DDT-compounds.

Long-term detrimental effects on wild birds are well documented (e.g. Ratcliffe 1967, Hickey and Anderson 1968, Wurster and Wingate 1968) and recently Stickel (1969) reported on laboratory studies which confirm that low levels of organochlorine compounds cause decreased reproduction. Risebrough et al. (1968 b) have shown that p,p′-DDE is as pharmacodynamically active as pp′-DDT in birds; hence it is not justified to suppose that DDE is less toxic that DDT unless one refers to acute lethal toxicity.

Similarly, DDT causes decreased reproduction in fish (see e.g. Burdick et al 1964); such an effect may directly decrease food availability for man.

Exposure of the general population (except nursed infants)

The dietary intake of pesticides is continuously surveyed in the United States. From data given by Duggan and Weatherwax (1967) it can be calculated that the average daily intake of DDT-compounds with food was about 0.06 mg per person in 1964/65 and 0.09 in 1965/66; *i.e.* about 0.0011 mg DDT-compounds/day and kg body-weight. An English survey in 1965 estimates the average daily intake of DDT-compounds to 0.06 mg per person (Robinson and McGill 1966).

The WHO and FAO of the United Nations have recommended a maximum acceptable daily intake (ADI) of 0.01 mg DDT-compounds/day and kg body-weight (WHO 1968). Maier-Bode (1968) has reviewed the dietary intake of several pesticides in relation to the recommended ADIs, of which the intake of aldrin+dieldrin equals the ADI of 0.0001 mg/day and kg body-weight (WHO 1968).

It has for a long time been hypothesized that the diet is the major origin of pesticide exposure for the general population. Recently, Deichman and Radomski (1968, 1969) and Radomski (1968) presented evidence that household use of spray pesticides may appreciably contribute to the body burden of DDT-compounds. The total exposure of the general population may thus be considerably more than that evaluated by analyses of food and total diet samples.

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* Contribution to: Deutsch-schwedisches Symposium auf dem Gobiet der Umwelthygiene am 12. and 13 juni 1969 in Baden-Baden.

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The, concentration of DDT-compounds in the adipose tissue of the general population in the United States is in average about 10–11 ppm (parts per million=mg per kg material) (see below). An estimation of the world-wide average yields about 10–15 ppm (see below), hence it might be assumed that the *average* exposure of the world population is of the same magnitude as that of the US general population. It must, however, be acknowledged that the individual exposure may vary considerably depending on many factors; place of residence, food habits, use of pesticides within the country and area of residence, use of household pesticide formulations, etc.

MAN'S BODY BURDEN

Man's body burden of DDT-compounds is generally estimated by analyses of adipose tissue following sampling by either biopsy or necropsy. Recently, analyses of blood have been introduced; however, these data are yet scarce and cannot be used for a general review.

Engst et al. (1967) have tabulated and reviewed most of the papers published on the concentration of several organochlorine pesticides in human adipose tissue. Several new reports have been published during the last years, many of which concern the situation in the United States as has also been the case earlier. Hoffman et al. 1967 (USA), Fiserova-Bergerova et al. 1967 (USA), Casarett et al 1968 (USA), Rappolt and Hale 1968 (USA), Davies et al. 1968 (USA), Radomski et al 1968 (USA), Bick 1967 (Australia), Wasserman et al. 1968 a (Australia) 1967 (Israel), Brown, 1967 (Canada), Abbott el al 1968 (Great Britain), Llinares and Wassermann 1968 (Spain), de Vlieger et al. 1968 (Holland), Wassermann et al. 1968 b (Argentina) 1968 c (Nigera).

The recent studies (Rappolt and Hale 1968, Davies et al. 1968, Hoffman et al. 1967) from three different regions of mainland United States indicate that the average concentration of DDT-compounds in the adipose tissue of the general population is about 10–11 ppm. Further, the data now available from about 20 countries indicate that the world-wide average is about 10–15 ppm.

The distribution of the individual values around the arithmetic average of the sample is often askew and some authors prefer to express their results in a logarithmic distribution. It has been pointed out that as much as 7% of the general population may have body burdens more than twice the arithmetic average (Lofroth 1969).

Several investigators point out that there is a significant difference between sexes, races, ethnic groups, and age-classes within the same general population; *e.g.* women having less than men, and white US citizens less than non-white ones.

Though, also finding such differences, Hoffman et al. (1967) evaluated with a simple t-test, without proper separation of the different sub-groups in sexes and races, that there was no difference between the concentrations of DDT-compounds in persons with normal and abnormal pathological changes.

HUMAN MILK

In 1945 Woodard et al. reported that dogs fed DDT excreted it in the milk.

Six years later Laug, et al. (1951) reported for the first time that lactating women of the general population excrete DDT in milk. Since then several reports have appeared, from the United States (West 1965, Quinby et al. 1965, Curley and Kimbrough 1969), Great Britain (Egan et al. 1965), Sovjet (Damaskin 1965), Hungary (Denes 1964), Italy (Kanitz and Castello 1966), Sweden (Westoo and Noren 1968), and Poland (Cwiertniewska 1969).

From these available data it can be estimated that the average concentration of DDT-compounds in human milk presently is about 0.1–0.2 ppm.

A breast-fed baby consumes about 150 g milk per day and kg body-weight and consequently the average baby ingests daily in average about 0.02 mg DDT-compounds per kg body-weight. This is twice the maximum ADI recommended by WHO and FAO of the United Nations.

Comment: It is generally acknowledged that human milk is superior to formula milk for parameters measured during infancy (see e.g. Haire and Haire 1968), and that human milk is the main available nutritious food for infants in large parts of the world (Jelliffe 1968); hence the human milk should not be abandoned.

There seems to be a striking difference between women and cows; lactating

women excrete in the milk more than 100% of the daily ingested DDT (Quinby et al. 1965) while cows excrete only 2–10% (Laben 1968).

PHARMACODYNAMICAL ACTION

Already 1950 Tauber and Hughes reported that female rats ingesting DDT had decreased ovarian cholesterol levels, a discovery indicating that DDT might have other effects on the mammalian system beside the neurotoxic ones. This indication has now become well substantiated, mostly by pilot studies using rather high dose levels (see *e.g.* review by Kupfer 1967).

There are now also available a number of studies which show that low level exposure to DDT result in changed metabolism of both endogenous and xenobiotic compounds in the mammalian system, especially the liver (Kinoshita et al, 1966, Schwabe and Wendling 1967, Naistain 1968, Datta and Nelson 1968, Gilett 1968, Yakoshko 1969). The dose levels used are of the same order of magnitude as those to which Man is presently exposed.

Similar pharmocodynamical effects have been found in adult humans exposed under occupational conditions (Krasnyuk and Makovskaya 1966, Paramonchik 1968, Kolmodin 1969).

No studies seem to have been performed in order to evaluate possible pharmacodynamical effects in babies fed human milk; it might be impossible to perform a strict scientific evaluation as probably as all human milk contains DDT-compounds—no proper control group is available. The detoxification systems of the new-born is not fully developed—the eventual long-term, life-time effects of a possible exogenous manipulation of these systems cannot be predicted. (cf. *e.g.* Brodie 1964)

The pharmacodynamical effects as well as other recognized effects, e.g. depression of electromyography potentials caused by DDT (Kailin and Hastings 1966 a and b), have constantly been disregarded by the proponents (Hayes 1969, Laws et al. 1967) of the safety of DDT in their studies limited to healthy adult men.

CARCINOGENITY

The tests for possible carcinogenity of several organochlorine pesticides have been reviewed by Terracini (1967). There is yet no conclusive scientific agreement as to the carcinogenic action of DDT. Terracini points out that the several positive results may have been caused by a synergistic action of the pesticide and other factors.

Kemeny and Tarjan (1966) found, in a multigenerational mice study, a tumor frequency of 8.9% in the treated group fed fodder containing about 3 ppm DDT and 1.2% in the control group fed fodder containing an unavoidable 0.2–0.4 ppm DDT. The DDT added to the diet of the treated group was recrystallized, purified p,p'-DDT, the melting point of which coincided with that of p,p'-DDT (Tarjan 1969).

Oral, continuous, administration of high doses of p,p'-DDT resulted in an increased tumor frequency in both sexes of two tested mice strains (Innes et al. 1969).

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Some Health-Related Needs in Pesticide Investigations

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The universal presence of pesticides in man, from the fetal stage on, calls for many studies: evaluation of toxicity in the fetus with reference to prematurity, pre-eclampsia, birth defects, etc., studies on detection of metabolites; disposal of pesticide wastes; chemical epidemiology; monitoring of occupationally exposed people; training programs for analytical chemists; many others.

It is entirely fitting that the Sixth Inter-American Conference on Toxicology and Occupational Medicine has selected pesticides as the topic for discussion. Diseases caused by non-viable entities in our environment are belatedly getting some of the attention that they have long deserved, and pesticides are an important part of these media. Pesticides confront us in ever increasing numbers and formulations, and they are not going away. They are in the food we eat, the air we breathe, and the homes we live in. Each of us carries his own body burden of pesticides. They are inescapable, and it behooves us to study them, to understand them, and to use them safely. This does not imply that pesticides are doing us harm; it does constitute a clear command for us to find out exactly what risks are involved in their use.

Considerable progress has already been made in this area; however, instead of relating progress, of which you are aware, I propose to cite some needs which I hope will be a challenge and an inducement to intensify efforts for the safer use of a very valuable armament to our survival.

First of all, evaluation of the toxicity of new pesticide chemicals involves a considerable portion of the effort of most toxicology laboratories. The need for this work is obvious, and closely related to it is the problem of screening test pesticides for toxicity to man. Data from animals can only be a guide, and there is often a great difference between toxicological effects on different animals. Better test animals are needed, and where safe and feasible, there is no substitute for human volunteer studies.

We know that there is a problem of potentiation or antagonism in the simultaneous exposure to certain pesticides and certain drugs, as well as between some pesticides. The extent of this is a moot question. The toxicity of a pesticide from its use alone does not necessarily indicate its potential toxicity when used in combination with other chemicals, and this problem needs further investigation. Dr. Deichmann, the Director of this Conference, has contributed substantially in this field.

It is known that the fetus in utero is storing organochlorines, at least as early as the fourth week of gestation. The effects of the low levels that now occur may be of no consequence to an adult, but a study should be made of the effects of these compounds on the fetus with particular reference to prematurity, pre-eclampsia and eclampsia, abruptio placentae, stillbirth, birth defects, spontaneous abortion, and congenital or infant malignancy.

The analytical problems in dealing with pesticides are legion, and a great deal of work is needed on the quantitative detection of more compounds in more types of substrata. The development of analytical procedures for detection of metabolites of pesticidal compounds is necessary before their metabolism and site of action in the animal body can be understood. The data reported from various laboratories are often difficult to correlate because of differences in analytical procedures. Rigid standardization is detrimental to progress, but data comparisons would be more meaningful if some standardization could be adopted by the various laboratories, at least until clearly better methods are devised.

There has been a relative lack of epidemiological investigations of chemical poisonings. Most epidemiologists have a background in infectious diseases, and few have been concerned with chemical epidemiology. More attention should be given to the prevalence and distribution of toxic chemicals in man and the environment. Concurrently, the determination of the prevalence and distribution of clinical and subclinical pathology in man is needed to discover and evaluate any causal or contributory relationship to pesticides.

Most State health departments have not given or have only begun to give attention to the many problems of recent origin resulting from our chemical environment. All State departments of health should be developing a surveillance system which could be used for monitoring occupationally exposed people. The appropriate routine analysis of blood and urine of heavily exposed workers, regardless of the chemicals to which they are exposed, would, in most instances, give warning of potential danger. This does not preclude the establishment and use of proper threshold limit values in air. The need for every area to have available an experienced forensic pathologist and a competent toxicological service is only too evident. More training programs are needed so that all State and many local health departments may have on their staff a trained analytical chemist and an epidemiologist well versed in the investigation of chemical poisoning. I might say that the Pesticides Program of the Public Health Service is anxious to help in this endeavor.

As a corollary to epidemiological and surveillance activities, routine monitoring of man and the environment is essential. Monitoring programs are being carried out by several government departments, and a monitoring journal which carries information on pesticide levels wherever they may exist, is now being published by the Pesticides Program for the Federal Committee on Pest Control. Several years of such work with more standardized analytical procedures should provide a better basis for epidemiological extrapolations.

There are probably 100,000 cases of poisoning from pesticides in this country each year, with some 150 accidental deaths. Yet, poisoning has not been declared a reportable disease, while at the same time, many far less important diseases are required to be reported. We need to know from a clinical and epidemiological point of view who gets poisoned with what, and where, when, how, and why. Until we can see the entire iceberg, it is hard to evaluate its magnitude.

Information that can prevent pesticide poisonings is available, but it must reach the public before it can accomplish its purpose. There is a great need for public information on pesticides, particularly at the local level. Many of the poisoning cases reported to us, all too clearly could have been prevented if public information had been adequate.

Better diagnostic procedures are needed, since pesticide poisoning may mimic many other conditions, and oftentimes a diagnosis is based on association rather than clinical signs and symptoms. Improved analytical, biochemical, and clinical tests are needed that can be adapted for routine use in small laboratories and even in the field.

The mode of action of many pesticides is not understood. A clearer understanding of this would be the starting point for the development of specific treatment. There is, at present, a great need for a specific antidote for cases of chlorinated hydrocarbon poisoning. Treatment is needed not only to counteract the symptoms, but to get to the site of action and reverse the effect. The problem is finding the mode of action. The importance of this is obvious.

A problem of increasing magnitude is the handling and disposal of pesticide wastes and used containers.

We have given this problem much consideration, and the Federal Committee on Pest Control has a special subcommittee appointed to study it. In spite of this, no practical solution has evolved. Waste disposal from manufacturing and formulating plants is handled in a variety of ways often resulting in contamination of the environment in the vicinity and pollution of streams for long distances.

In agricultural areas of heavy pesticide usage, the disposal of containers is a formidable problem. Abandoned pesticide containers are strewn throughout the entire length of the Mississippi levee. A system of returnable drums or of easily disposable containers and an organized plan of disposal is a *must*. Certain bacteria and fungi are apparently acclimated to metabolism of specific pesticides. Strains of bacteria have been developed that utilize DDT as a source of energy, converting it into CO_2 (Johnson, R. F., Personal Communication, February 1968). There may be other organisms that would break down toxic chemicals to harmless materials. Investigations are needed to determine if such methods can be used for the problem of pesticide waste disposal or for ridding areas of accumulated residuals.

A related problem involves the transportation of pesticides and their storage. I need only mention the recent incidents of large scale human poisoning in Saudi Arabia, Qatar, Tia Juana, Jamaica, and Colombia as an example of the importance of the problem. Fortunately, and surprisingly, it has not happened here. The U.S. Department of Transportation lays down regulations governing transportation of hazardous materials, and these must be familiar to and followed by all concerned if such incidents are to be prevented. One real problem is storage of pesticides with edible products after they reach their destination. This is a State and local matter which desperately needs attention.

We frequently get requests from States for help on formulating legislation governing the control of pesticidal chemicals. There is a great need for more uniformity in State regulations governing the use, transportation, and storage of pesticides. Efforts are being made by the Public Health Service and the U.S. Department of Agriculture to assist the States in this regard. Fortunately, there is already a considerable uniformity regarding the registration of pesticides.

The transport mechanism of pesticides through the environment is inadequately understood, even that resulting from the runoff from farm land. The biological magnification of pesticides in their passage through the food chain needs to be further investigated. As an example, in one study of lake water treated with DDD there was a concentration in the water of 0.02 ppm immediately after treatment. Residue levels 13 months after treatment were 10 ppm in plankton; in fat from plankton-eating fish, 903 ppm; in fish from carnivorous fish, 2690 ppm; and in fat from fish-eating birds, 2134 ppm. This represents a 500-fold increase in levels in plankton and a 100,000-fold increase in fish-eating birds over levels occurring in lake water after treatment.[1] There is no indication that the intake of pesticides in man's food is of any significance healthwise, but man who is at the end of his food chain should find out.

Nearly a billion pounds of pesticides are produced in this country each year. We do not have sufficient knowledge of where these pesticides are being used. If we had accurate recording of the use patterns of pesticides, we might be able to correlate observed effects with pesticides used. We would also be able to anticipate problems which might be likely to develop in particular regions. The problem of recording the use pattern of pesticides is a difficult one and must be considered in relation to other pressing needs.

Presently, a considerable effort is being made to substitute other methods for chemical control of insects with the idea that they would be less hazardous to health. This matter was considered by the 16th Meeting of the World Health Organization Expert Committee on Insecticides in September 1966. They concluded that a biological agent or the toxic product of an organism will not necessarily present either a greater or lesser health hazard than a synthetic material. Contrary to the popular belief that "natural" substances are harmless, they pointed out that the most poisonous materials known are in fact, of natural origin. Finally, they concluded that any material, living or dead, that is proposed as a pest control agent should be submitted to the same searching examination for potential toxicity to man as is applied to synthetic pesticides. Particular attention was called to hazards that might be inherent in the use of fungi since some of these are incriminated in some of the most serious of human diseases. If and when other methods supplant the use of chemicals as pesticides, the toxicology problem will not be eliminated, but only changed.

These are a few of the many problems that confront us. Their solution is a challenge to our ability and a necessity to our well-being.

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Presented at the Sixth Inter-American Conference on Toxicology and Occupational Medicine, University of Miami, Coral Gables, Florida.

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July, 1969

MEMORANDUM ON PESTICIDES

The pesticides issues are complex; there are few extremists on either end of the spectrum who claim that the use of chemicals for pest control is either all good or all bad. Opinions do differ, and differ widely, as to whether the use of certain chemical compounds should properly be banned or more strictly regulated.

This memorandum represents an attempt by the Clearinghouse to put the controversy into perspective by identifying the principal questions that have been associated with it. The questions are not answered here; it is unlikely that many answers to these questions would go unchallenged by the other parties to the controversy. It is our hope, however, that as a result of this effort to pull the issues together, some answers may begin to emerge, and that the areas of agreement, which are more substantial than one might think, will also become clearer. By bringing the questions together in one context, we hope to encourage a more adequate understanding of the overall problem, the benefits and costs associated with the use of pesticides, and the risks that their continued use may entail.

The Clearinghouse has assembled a panel of experts on the issue, representing different disciplines and points of view. The members of this panel, all Advisors to the Ad Hoc Committee on the Environment, have agreed to provide information and assistance on these questions to members of the Committee. This panel was given an earlier draft of this memorandum and asked to comment upon it; those comments have been most helpful and are incorporated herein.

The principal dispute over pesticides today relates to the use of the chlorinated hydrocarbons, or persistent pesticides: DDT, dieldrin, aldrin, endrin, heptachlor, toxaphene, chlordane, lindane and BHC are the ones most frequently mentioned. Parathion, an organophosphate that is vastly more lethal than any of these, but is at the same time more degradable and short-lived, has also been criticized. For the most part, however, the questions and comments in this memorandum relate to the persistent pesticides.

These tend to be fairly long-lived, indiscriminate in their toxic effects, and widely distributed in the biosphere - the envelope of life that surrounds the Earth. Opinions differ widely as to the dimensions of the threat that they may or may not pose to man, and to a somewhat lesser extent, his environment.

In our view, there are five basic issues in this controversy:

1. What are the patterns of use and misuse that have created the problems underlying the 20-year old controversy over chemical pesticides? (See Part II)

2. What are the nature and severity of the hazards associated with these problems? (See Part III)

3. What alternatives are available which may involve lesser hazards? (See Part IV)

4. What costs (social and economic) are predictable if these alternatives are adopted? What, if they are not? (See Part V)

5. What mechanisms ought to be considered, if any, to permit us to deal with these and future problems more adequately? (See Part VI)

PART I

Background

Sweden has banned the use of dieldrin and aldrin permanently, and DDT and lindane on a conditional or temporary basis; Denmark has banned the use of DDT out of doors. Michigan has barred DDT and Wisconsin, Arizona and California are moving in the same direction. Similar efforts are being made in New York, Pennsylvania and other states. In Wisconsin, militant citizens' organizations are mounting a serious attack on DDT before the Department of Natural Resources. In all of these cases, the basic objections to these chemicals are that they tend to persist for long (but somewhat indefinite) periods of time, attack more than the target insects, and are inadequately understood in their long-term effects.

(Pesticide opponents claim that, notwithstanding the public clamor over Rachel Carson's Silent Spring, published six years ago, there has been little if any constructive response from the chemical industry or the government. Although Senator Ribicoff held extensive hearings on the subject in 1963 and 1964, no substantive legislation resulted.)

The Wisconsin case is still pending; the issue is whether DDT may properly be considered a "Pollutant"; i.e., whether its use results in "acute or chronic (injury) to animal, plant or aquatic life". Wisconsin's water quality standards have been Federally approved, and the FWPCA has suggested that DDT might fit the definition of a pollutant under most state standards if it could be demonstrated to be harmful to aquatic life. This last contention, according to some scientists, hardly requires proof.

WCBS-TV in New York City recently produced an excellent short documentary on the effects, present and potential, of DDT upon marine life. The Clearinghouse has been given a film of that program for the use of the members of the Ad Hoc Committee and its Advisors; the film includes interviews with Justice Douglas, Senators Hart and Nelson, and Congressmen Dingell, Ottinger and Ryan, all of whom commented favorably on the program.

A Committee on Persistent Pesticides, set up by the National Research Council and chaired by Dr. James Jensen, has recently submitted a report to the Department of Agriculture (referred to as the Jensen report). This report is considered by many to be considerably more critical of the status quo than earlier NAS/NRC documents, and merits careful reading. The philosophy of this report is perhaps best exemplified by the following:

> Where little or no information is available concerning the transport, accumulation characteristics, and degradation products of a long-lived (persistent) synthetic chemical, it would appear prudent for man to refrain from needlessly releasing the chemical into the biosphere. The crucial questions are: What are the degradation products? How toxic are they? What is their behavior in nature? If a long-lived chemical is released and is later found to be toxic, nothing can be done about the store already dispersed; it must remain in the biosphere until dissipated by the slow processes of degradation and removal. Release of short-lived material is a different matter. If such a material is released and is later found to be hazardous, the store in the biosphere will be rapidly reduced once the use of the material is discontinued.

Any errors which may have crept into this memorandum are entirely ours and quite unintentional. The Clearinghouse will very much appreciate any such being called to its intention. It is not our purpose to write an indictment or a clean bill of health. That purpose is rather to reduce the controversy to meaningful language and manageable proportions.

PART II

Patterns of Use and Misuse

World agriculture depends today upon the extensive use of pesticides to maintain current levels of production. Pesticides have also proven of great value as an effective means of combatting disease. Notwithstanding these positive and unquestioned benefits, several questions can be raised concerning the patterns of use as these may create or exacerbate existing problems.

1. Is our traditional dependence upon DDT and other, similar insecticides necessary - or are other, less lethal, but effective alternatives available? Many claim that more desirable compounds are already available.

2. The major value of DDT is considered to lie in its persistence: it need not be applied frequently in order to be effective. This saves labor costs and, coupled with its relatively low cost of manufacture, makes it particularly attractive to the grower. Its persistence is at the same time one of its major defects: DDT is a world traveler, affecting most or all forms of life on the Earth. Have its long-term effects been adequately studied and extrapolated?

3. Are there regional or geographic patterns of use that create problems as to the more toxic of these compounds? For example, it is estimated that more than 2/3 of the DDT used in this country is used to protect the cotton crop. Do other relevant patterns exist? Are there perhaps regional weather patterns that may be unsuitable for application of specific compounds?

4. Most of the undesirable effects attributed to these chemicals occur after they have been transported away from the target areas. Do we know enough about the transportation systems now in operation, carrying DDT as far as Antarctica? Is there any practical way of inhibiting that transportation process?

5. The ready accessibility and low cost of many insecticides make them particularly attractive for regular or programmed application, often when their use may be wholly unnecessary. How extensive is this problem, and what is its magnitude? To what extent is it balanced by the unavailability of competent personnel to advise on optimum use?How should we encourage the increase in the reservoir of trained personnel?

6. The American housewife is conditioned by many factors (one of which may be Federal law) to accept only "perfect"

produce. The level of pesticide applications to produce these results is far greater than would be required if an occasional worm or bruise were acceptable. Is this a significant problem?

7. Pesticides are applied in a number of ways: aerial spraying, hand spraying, etc. What problems are associated with application methods, and how might they be better handled?

8. To what extent are farmers and other large pesticide users forced to use chemical controls by the fact that their neighbors are doing so and in the process effectively limiting natural predation in the area?

9. Recent experience demonstrates cases where pest problems have grown, rather than decreased, following introduction of pesticides. This is usually due to the development of resistant target insects, coupled with simultaneous destruction of their natural predators. This phenomenon suggests that an entirely different approach may be called for: one which would permit reduction of target pests to acceptable levels by integrated control programs (including cultural, biological and selected discriminatory chemical methods) rather than by wholesale dependence upon chemical methods.

10. Many consider existing programs for monitoring the use of pesticides in the United States to be crude and inadequate. There is no global monitoring system in existence. How important is it to develop an adequate monitoring system, and how ought such a system to be established?

11. Little is known about the specific application of different chemicals. How important is it to be able to know with certainty that, on a given date or dates, x pounds of DDT, dieldrin, etc. were applied in a certain area? If it is important, how should a reporting system be organized?

12. All, or almost all, pesticides degrade over a period of time. For some, this occurs within hours or days; for others, the process requires years. If all the persistent pesticides were discontinued tomorrow, do we know how long it would take for their effects to disappear? Are we making assumptions about the rate of degradation of DDT etc., based upon the fact that we cannot find them, when in fact they have simply moved to an area where we are not looking for them? Here again the complexities of the transportation system present significant questions, for which we do not appear to have answers. Are we indeed even asking the right questions?

13. Is it possible to deal rationally with the philosophy adopted by some home gardeners: "If a little is good, more must be better?"? How significant a problem is this?

14. Most of the pesticides controversy centers on the use of a few insecticides. Herbicides and fungicides are also used extensively; have the disruptive impact of these upon soil and water ecosystems been adequately considered? What does this mean in terms of human ecology?

15. Between 1957 and 1967, the use of DDT declined significantly. In that same period, however, the use of other members of the same family, principally dieldrin and aldrin, has increased correspondingly, so that the overall levels of application remain roughly equal. Dieldrin and aldrin are considerably more toxic than DDT. What does this progression mean in terms of man and his environment?

16. Is the intensity of application of persistent pesticides declining? The Jensen report suggests that it may be, but how does this square with the steady production levels described above (which were noted in that same report)? Even more importantly, what are the world production figures?

17. The major thrust of pesticide criticism has been directed to the chlorinated hydrocarbons. Lead, arsenic, copper and mercury are also used to destroy pests and are highly toxic to many forms of life, including man. How serious a problem do these present?

18. DDT is fat soluble, and tends to concentrate in animal fats and livers. At some point, these levels tend to stabilize, and the average adult American has levels of 10-12 parts per million of DDT in his or her body. Mothers' milk is said to have levels of four times the amount of DDT that we will tolerate in interstate commerce in cows' milk. Is enough known about the processes of metabolization and elimination of the persistent pesticides?

19. Experiments are under way to hasten the degradation process of DDT by combining it with a catalyst, so that it will be rendered harmless after two to four weeks from application. Does this approach make sense, or is it no more than a patchwork approach to a much more basic problem?

20. Inherent in the pattern of use of persistent and some nonpersistent pesticides is the fact that once a farmer or group of farmers begin to use them, they are committed and cannot thereafter stop without exposing their crops to vastly increased numbers of pests, until natural controls reestablish themselves. There is an obvious analogy to drug addiction, which includes the temptation and perhaps even the necessity to escalate to more powerful substitutes, as pests become immune

to some controls. (This immunity is said to occur very seldom in the case of the non-persistent chemicals.) If society were to insist at some point upon the banning or phasing out of the persistent pesticides, how can it help the farmer to "kick the habit" without exposing himself to large pest incursions in the process? Is anyone looking into this question?

21. In our attempts to learn the impact of these chemicals, have we been asking the right questions? The Jensen report states that "reasearch on the effects of persistent pesticides in the ecosystem is concerned almost entirely with the relatively few forms of life of direct interest to man." Ought this research to be expanded, and if so, how?

22. All men and animals are said to have DDT in their bodies; One way or another, it almost certainly has some effect upon us. (Whether or not this effect is substantial is another question altogether.) Some scientists have questioned whether DDT, or other chemicals, may have a synergistic effect, increasing or decreasing the impact of other chemicals which we take deliberately, such as insulin or aspirin. Has this been adequately considered, and if not, why not?

PART III

Known and Suspected Hazards

At least with respect to man, it will be difficult and perhaps impossible to demonstrate with certainty the adverse consequences of pesticide use upon health. Indeed, a strong statistical case has been considered to have been made against tobacco, with less than impressive results. Some scientists feel, however, that there are definite indications of health hazards to man:

1. Carcinogenic. A recent NIH study (an interim report of which was printed in the Congressional Record on May 1, at the request of Senator Hart) indicates that DDT and some other chemical compounds can cause tumors in mice. Interestingly enough, none of the other persistent pesticides were tested in the same study, which considered some 120 compounds. The reason given was that when the study was set up in 1963, no one thought that these other pesticides would still be in use, since less dangerous alternatives would have been found. Does this study indicate comparable hazards for man?

2. Mutagenic. Some scientists question whether DDT and others may have an adverse genetic effect upon man; some experiments indicate that they do have such an effect upon other animals and birds; in man's case, is the problem compounded by his relatively long life and reproduction span?

3. Toxic. DDT is enzyme-inductive, and is said to have created serious problems for rats and birds. These effects may not be confined to the species tested. Actual physical damage to man from the use of these compounds appears to be rare; although scientists suggest that, because of our long lives, we may be exposed to dangers which we understand only imperfectly. More research in this area appears to be indicated. Russian scientists are said to feel that adverse human effects may take a decade or more to appear. What additional research ought to be done on this question?

4. General. Rarely discussed is the fact that the rapid rise in the use of DDT and its relatives has taken place since the early 1950's, and that the present adult population was never exposed to these as children. Not until today's children have grown to maturity and themselves become parents can the long-term effects be determined. Against this must be contrasted the extensive tests made upon workers in a plant manufacturing DDT, where their exposure and intake is considerably greater than that to which we are presently exposed or are likely to be exposed - yet their health is said to be unaffected. It is true that this is a very small sample (30-40 workers), but is this a complete

answer? To what extent is the integrity of this research compromised by the absence of children, older people, pregnant women, etc., from the labor force and study group?

The hazards to species other than man may be somewhat easier to document. We are coming to the realization that man is interdependent with many species and forms of life, and very strong suggestions have been made that we must await a more adequate understanding of the nature of this relationship before we set out to make changes that may prove to be irreversible. Certainly we should know more about the potential long-term effects upon species upon which we are directly and visibly dependent: domestic livestock and fowl, marine and fresh water fish, and grains. But ought the inquiry to stop there? The Jensen report concluded that "there is substantial evidence of continuing damage in some areas, particularly to fish and birds, by pesticide residues at present environmental levels." We appear to be woefully ignorant about the effects of the persistent pesticides upon natural ecosystems - especially non-target areas such as the rivers and oceans. For example:

4. Some feel that there can no longer be denied to be a serious problem concerning the use of DDT and increased mortality in fish life. This mortality is said to approach 100% when DDT levels reach 5 ppm in fish eggs - less than one half of the concentration said to exist in the average American adult. If true, this raises important questions for man both as a healthy creature and as a consumer who looks with increasing intensity to the sea for sustenance.

5. Scientists point to a relationship between the incidence of DDT in the environment and the ability of birds to lay eggs with shells thick enough to hatch. They point to the disappearing American bald eagle as a particularly unfortunate case in point: some eagles are said to be laying eggs with no shell whatsoever.

6. Much of our oxygen is produced by tiny monocellular forms of life in the oceans; estimates have placed this production at roughly 2/3 of the total world oxygen production. It has also been suggested that marine plankton are particularly susceptible to pesticides. Is this correct, and if it is, what are the dimensions of the problem that it suggests for the future?

7. The most adverse consequences of the use of persistent pesticides probably occur as a result of what is known as "biological magnification", involving the increase in pesticide concentration as animals move up the food chain. This is particularly true of the carnivores; somewhat less so for man who is at the end of a shorter food chain and who rarely eats the flesh of carnivores. Does this phenomenon spell extinction for some forms of life, such as the bald eagle? If so, ought we now to take steps to preserve representatives of those species, so that they may safely be reintroduced when the concentration levels have diminished?

PART IV

Available Alternatives

There has been a good deal of recent research upon available alternatives to the present patterns of pesticide use. These alternatives involve both chemical and nonchemical approaches.

As to the chemical alternatives, the questions are relatively simple:

1. If it were concluded that there are compounds and categories of existing chemical controls, suppression or elimination of which may be desirable, are there other chemical controls which do not appear to present equivalent or greater hazards? How much would they cost to manufacture and how much to apply?

2. If these do exist, within what time period could they be developed to fill the vacuum created by the withdrawal of the less desirable forms now in use?

The nonchemical alternatives investigated in recent years have been imaginative, and some have proved to be remarkably effective. Some of these were discussed in the 1963-1964 Senate hearings, but surely we know more today about the effectiveness of such approaches as:

(a) Host resistance - developing tougher and/or less palatable wheat, cotton, etc.
(b) Biological controls - developing predators, diseases, organisms and hormonal controls to limit pests.
(c) Cultural controls - early or deep plowing, seasonal shifts, etc., to eliminate the conditions in which pests can thrive.
(d) Sexual sterility - releasing great numbers of sterile male pests to breed unsuccessfully.
(e) Attractants - luring pests to places where they can be safely destroyed.
(f) Natural controls - setting the stage so that Nature can do the job.

3. How well do we know the extent to which the nonchemical alternatives could be substituted for present procedures? To what extent is such a program dependent upon trained personnel who do not yet exist? What incentives ought we to develop to ensure that enough scientists will be attracted to this area of research?

4. What additional research ought to be done on these methods? By whom (is there any way that industry could be induced to move into this area)? With what priority? And - how much are we prepared to pay?

5. How effective are these alternatives likely to be, in terms of replacing chemical controls in the future? How quickly can this be done?

6. What problems and hazards may themselves be associated with the chemical and nonchemical alternatives proposed in place of the persistent pesticides? Some of the chemicals are far more hazardous to man; others cause injury to animals and insects which we consider to be beneficial. Have these questions been adequately considered?

PART V

Costs

The pesticide industry is a multi-million dollar business - in 1967 insecticides alone accounted for sales of $212,568,000, and this takes no account of the costs associated with their application. The benefits of pesticides are also considered to be great. A 1965 study indicated that for every dollar invested in the research, purchase and application of pesticides, there would be a return in terms of increased production of between $4 and $5. That same study pointed to returns of about $30 for every dollar invested in biological controls in the area tested, and it indicated that this figure was, if anything, conservative. The reasons for the spread are apparent: biological controls involve only research costs, and if the research is effective, are nonrecurrent - once the predator is established, it generally can survive without additional help from the grower.

Rarely considered in the context of the overall problem, but in our judgment critical to an adequate understanding of the problem, are questions such as:

1. What are the "trade-offs" associated with the use of chemical pesticides? Must we tolerate the disappearance of the California Condor in our efforts to control the coyote, a relatively innocuous beast? What "price" do we pay, in our efforts to control Dutch elm disease and the gypsy moth (now enjoying its U.S. centennial), in the contamination of the coho salmon and in the poisoning of its fry?

2. How accurate are the figures associated with the benefits ascribed to pesticides? Is "market price" the best available indication of value, when an increase or decrease in the total quantity of goods reaching the market may or may not have an effect upon the total price paid by consumers for those goods? To what extent are changes in crop yields correctly attributable to the use or nonuse of pesticide "X"? Would alternative controls be equally effective and equally inexpensive, considering <u>total</u> costs, both direct and indirect?

3. How are the health problems for man and his world to be related to the dollar costs associated with the use or nonuse of pesticides? What is it worth to you and your neighbor not to run the increased risk (of whatever magnitude) of cancer?

4. Similarly, how are the increased hazards to plant and animal life to be brought into the equation? Just because these costs cannot easily be related to dollars and cents does not seem to be a reason to ignore them - but what values should they be given?

5. What steps ought we to take to encourage the assembling of data that will make this kind of inquiry meaningful? To what extent are government agencies doing this now, and ought they to be pushed?

PART VI

Control Mechanisms

The Federal system for regulation of pesticide use is fragmented; many feel that it is quite inadequate. It is only fair to say that the industry does not agree, and that the officials of the agencies concerned are officially contented with the status quo. Briefly (and necessarily, therefore, inadequately) the division of responsibility is as follows:

USDA - research on biological alternatives, reviewing adequacy of labels, determining that the proposed compound has some efficacy, and registering for use. There is some conflict as to whether they can and will remove compounds from the market, when they are found to be undesirable.
Food and Drug Administration - establishment and regulation of tolerances in foods produced for human consumption.
Public Health Service - research on hazards associated the use of pesticides; advice on vector control of disease (all human-oriented).
Interior - research on hazards to fish and wildlife.

It might also be added that the positions of these agencies on common questions may not always be consistent, although the inconsistencies tend to be smoothed over outside of the family.

The claim has often been made that these agencies are inadequately concerned with the long-range ecological effects of the use of pesticides upon man and his environment. USDA is under more or less constant attack on the ground that it serves as a promoter of the compounds that it is set up, however inadequately and incompletely, to regulate. Certainly the lines of communication between the Department and the industry are excellent - as indeed they should be.

A number of specific problems have been identified as associated with the existing regulatory structure. This list is by no means exhaustive. But these are some of the more common complaints and suggestions:

1. It is difficult for the homeowner and small farmer to obtain adequate information as to the pest control options that are available to him, and their potential values and costs. This makes it difficult even for the individual who has a well-developed "ecological conscience" to be sufficiently informed to exercise true freedom of choice.

2. The FDA cannot, under present budgetary and manpower limitations, adequately sample the food reaching the market. This operates to decrease the pressure upon the grower to conform to approved application procedures, since he knows that the chances of his being caught are comfortingly small.

3. USDA claims that its existing authority is adequate to permit it to police and to prevent the export of pesticides found to be undesirable for U.S. consumption. Others say that this putative authority is seldom if ever exercised, and that these compounds find their way into the world market without significant restriction.

4. There is a real question expressed as to the effectiveness of any system which depends upon the adequacy of labels for its impact. Man is fallible, and not inclined to read the small print. Many pesticides are misused for just this reason.

5. USDA is presently considering permitting heavy concentrations of DDT, dieldrin, etc., to be used in and around international jetports as a means of preventing insect immigration. This may pose a real problem in the future, considering the fact that many of these airports near and often on rivers and estuaries: Kennedy and the proposed Everglades airport are an excellent example. No one seems to be clear on what is proposed, what controls may be exercised, or how effective such a step might be.

6. The packaging of some pesticides may encourage their misuse - a homeowner forced to buy a 25 lb. bag of insecticide may be tempted to use it in ways not prescribed on the label (assuming that he reads it at all) - just because it is there and already paid for. If he could have bought an 8 ounce package in the first place, the temptation would never have arisen.

Considering the magnitude of the problem, many serious suggestions have been advanced that a new regulatory agency should be established on the Federal level, with the powers to (1) develop its own testing program, (2) to recall and interdict the use of pesticides found to be undesirable at any time, (3) perhaps to require prescription purchase of the more dangerous compounds, and to establish licensing procedures for persons to apply these, and (4) to provide a central source of information as to the most desirable forms of pest and disease control in special circumstances.

It has also been strongly suggested that the burden of proving the desirability of introducing new pesticides be placed upon the manufacturer. Some scientists claim that the effect of our experience with DDT is what amounts to a long-term chronic experiment, performed upon an unwilling group of subjects, involving the effects of continued exposure to DDT. If no harm has been done, well and good; but what if it should turn out that the results have not been beneficial? In other words, ought the lack of harmful effect to be a necessary element of proof for manufacturers seeking to promote new compounds?

The Jensen committee pointed out that our existing regulatory structure is fairly ineffective, save as it relates to basic food crops. The report states that these regulations do not significantly affect the use of pesticides on non-food crops, nor does it effectively act upon the chemicals which travel long distances from the point of application and which do not degrade. Addressing itself to this problem, the report stated: "Unless there is a change (possibly in the form of regulatory action) by which the persistent materials lose their advantage, they will probably continue in general use." It is difficult to see what non-regulatory changes would have such an effect.

The Jensen report closed by stressing the need for more adequate research and a greater educational effort - to ensure that pesticides are used with a minimum adverse impact on the environment. This appears to beg the immediate question: ought we to change the regulatory structure as well?

An alternative to this approach would be to leave the primary responsibilities where they now lie, but to increase the present limited authority of those agencies to impose more adequate and flexible controls, better related to a common purpose and philosophy. This would seem necessarily to involve coordination (a popular but vague concept) of agency views at some level higher than those agencies themselves - it would be a proper subject for concern on the part of the newly-established interdepartmental Environmental Quality Council, and may in fact be under review at present.

An important factor to be borne in mind is that the pesticide manufacturing industry today is said to obtain only a low rate of return for its investment, due at least in part to the costs of conforming to the existing regulatory framework. If this framework is to be changed, efforts should be made to see that it becomes no more burdensome, lest we impoverish the continuing research effort by forcing competitors out of the marketplace.

Pesticide Pollution

Part I. *Are the risks well calculated?*

It wasn't until Rachel Carson's "Silent Spring" brought the matter to nationwide attention that the general public realized just how toxic pesticides are and how carelessly they have been used. That book was first published in 1962 by Houghton Mifflin Co. and later made available in a special Consumers Union edition for REPORTS readers. Now, seven years later, the pesticide market continues to boom—despite still-unfolding evidence that the misuse of pesticides may well pose a threat to wildlife, natural systems and man himself. This article, the first of two, reviews some of the reasons why responsible scientists and citizens are concerned about the threat of pesticides. It is a threat that, unfortunately, can only be partially defined. Research on the long-term effects on man is almost completely lacking, and conclusions from research already performed on other animals do not necessarily apply to man. Thus, discussions of possible carcinogenic and mutagenic effects of pesticides on man must, of necessity, be speculative. Still, the number of unexplored risks should be warning enough that continuous monitoring of pesticide dangers demands high national priority. Although the article that follows is not CU's work and we therefore cannot endorse every statement or implication, we feel that it is a valid statement of concern and an effective antidote to apathy. The article itself is an abridged version of a recent CF Letter, a periodical published by The Conservation Foundation, an independent, nonprofit group concerned with environmental issues. Part II, to be published next month, will look at Government attempts to limit the dangers, at the politics of pesticides, and at alternatives for solving the problem. Reprints of the entire report are available for 50¢ per copy from The Conservation Foundation, 1250 Connecticut Avenue, N.W., Washington, D.C. 20036.

Pesticides, complex chemical compounds, pose a complex dilemma. They damage the world's fish and wildlife resources. They are causing serious and subtle changes in the environment. Indeed, they are under suspicion of endangering man himself. Yet man finds them tremendously useful in his struggle for health and survival.

For some 25 years, man has been concocting an astonishing assortment of synthetic chemical poisons and spreading them over the planet. In doing so, he has been taking some not-very-well-calculated risks. He has been rebuked and warned for being careless, for not fully understanding the consequences. Some restrictions have been imposed; somewhat greater care is being taken. But man continues the liberal use of pesticides to wage war on the endless varieties of insects, bacteria, rodents and other small creatures that continue to plague him so relentlessly—by attacking him directly, or by devouring much of his precious food and fiber supply.

To be sure, the widespread dissemination of pesticides has had extremely tangible benefits which, it is argued, would otherwise have been unattainable. Pesticides are credited with making life comfortable and nuisance-free, indoors and out. They are credited with saving countless lives through the control of malaria, cholera, typhus, Rocky Mountain spotted fever, encephalitis and other diseases. And they are credited with helping man raise and protect an extraordinarily plentiful supply of inexpensive food.

The farm and chemical industries point to the crops and livestock saved from destruction, with values measured in the billions of dollars each year. But the evidence also shows that, in the rush to rely on expedient chemicals, mistakes have been made and safer alternatives have been passed up. There have often been unintended side effects, including losses of fish and wildlife. Finally, the evidence *suggests*, at least, that man may be seriously harming *himself* in the process. Certainly he is taking risks.

How widely used?

How extensive is the use of pesticides? U.S. farmers last year spent an estimated $800 million on them. Total domestic sales this year are forecast at $1.7 billion, most for agriculture, but including $255 million for household and garden use, and another $255 million for industrial and institutional use. The $1.7 billion represents a dramatic increase from the 1965 total of $1 billion.

There are some 900 basic chemical compounds used to formulate thousands of synthetic commercial pesticides. Classed according to purpose, these include insecticides, herbicides, miticides, fungicides and rodenticides. Most famous—or infamous—is the ubiquitous DDT. But there are

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many others—endrin, dieldrin, aldrin, chlordane, toxaphene, lindane, methoxychlor, heptachlor, parathion, malathion, 2,4-D, 2,4,5-T, captan, carbaryl, warfarin. There are chlorinated hydrocarbons (DDT), organic phosphates (malathion), and carbamates (carbaryl). Their properties, effects, dosage and use vary widely. The crucial questions raised by the use of a pesticide are: Is it effective on the target insect? What other organisms does it kill? Is it dangerous to fish, wildlife, man?

A pesticide may or may not be highly toxic, or poisonous, on direct contact, to various living things. It may or may not be highly persistent, or resistant to being broken down by nature into harmless components. The insecticide parathion, for example, is extremely toxic. Yet it breaks down quickly in the environment. On the other hand, DDT is considered only slightly toxic to man; but it may persist for years, with consequences unknown.

Some effects of pesticide use

Many ill effects of pesticides on marine life and wildlife are well documented; the literature on the subject is voluminous. A sample of the findings:

Experiments indicate that DDT in very small concentrations can reduce growth and photosynthesis in certain marine plankton. "Such single-celled algae are the indispensable base of marine food chains," says Dr. Charles F. Wurster, Jr., of State University of New York, Stony Brook. Photosynthesis by marine plankton is estimated to account for more than half of the world's oxygen supply. Wurster says that "interference with this process could have profound, worldwide biological implications."

"Marine organisms, especially crustaceans," says William A. Niering, Professor of Botany at Connecticut College, "are extremely sensitive to the persistent pesticides. As little as 0.6 to 6 parts per *billion* (in the water) will kill or immobilize a shrimp population in two days." The Interior Department's Bureau of Commercial Fisheries says tests show that "oysters stopped feeding and exhibited erratic shell movements when exposed to less than one part per million of many chlorinated hydrocarbons. Shell formation in oysters was inhibited by concentrations of a few parts per billion."

Cases in which large numbers of fish have been killed are plentiful. The most celebrated, probably, were the massive kills in the lower Mississippi River from 1960 to 1964. An elaborate investigation traced the cause to endrin, apparently from a chemical plant.

Nearly a million smelt coho salmon were killed recently because of DDT, say Dr. Howard E. Johnson and Charles Pecor of Michigan State University, who deduced that residues were accumulated in the egg yolk of adults, and their fry were poisoned during final absorption of the yolk sac.

The widespread loss of robins and other birds—where elm trees are treated with DDT for Dutch elm disease—provides a simple example of "biological magnification," or the unique way in which "hard" or persistent pesticides can be concentrated in more and more potent doses as they move up the food chain. When leaves from a sprayed elm fall, they are eaten by earthworms. The DDT doesn't harm the worms; but it accumulates in their tissues. When robins eat the worms, they accumulate it in ever larger and finally lethal doses.

The magnification process also occurs when minute quantities of a pesticide accumulate in tiny marine organisms and are transferred in ever-increasing amounts to plankton-eating fish, carnivorous fish and finally birds of prey. This is possible because pesticides such as DDT are almost totally insoluble in water, but very soluble in fat. So they accumulate and are stored in the fatty tissue of birds. When fat reserves are used up rapidly, such as in migration or reproduction, the poisons enter other parts of the system, apparently attacking the nervous system. Says Dr. Ralph A. MacMullan, director of the Michigan Department of Conservation: There is "strong circumstantial evidence" that this sort of magnification is responsible for the alarming decline of many species of birds such as the bald eagle, osprey, peregrine falcon and sparrow hawk.

Oddly enough, such birds are not normally poisoned directly by the toxic pesticides. It is now widely believed that *reproduction* is severely hampered, because residues of pesticide such as DDT are transferred in lethal amounts to embryo birds via the egg yolk, or because the pesticides upset liver enzyme activity and therefore calcium metabolism, resulting in eggshells so thin embryo chicks cannot survive in them. Studies have also indicated that some birds become strangely nervous and aggressive and destroy their own eggs.

There have been cases in which frogs, snakes and birds, as well as wild and domestic animals, have been killed by pesticides, sometimes in massive numbers. Rachel Carson, in her 1962 best seller *Silent Spring*, cited dozens of instances. Many such kills are due to outright misuse, which of course greatly magnifies the dangers and damage of pesticides. But knowledge, or communication of it to the right people, has not been sufficient to prevent misuse. We do not in fact yet know all the ways in which pesticide applications may be upsetting the balance of nature, though examples from the past are plentiful.

We do know that persistent pesticides are carried throughout the world by wind, water and living organisms. Often cited is the fact that even penguins in the Antarctic—so far from any pesticide use—contain residues of DDT. Dr. George M. Woodwell, an ecologist at Brookhaven National Laboratory, speaks of the "serious and subtle changes caused by continuous exposure to low levels of pesticides in the environment . . . that threatens to degrade the biota of the earth and especially the oceans in a very serious way."

The dilemma for man

The weight of expert opinion currently holds that humans are not *directly* harmed by careful use of pesticides. There is apparently no solid evidence of such harm. But practically every human accumulates some pesticides which, as in birds, are stored in body fat. In the U.S. the average is thought to be about 10 to 12 parts per million. Scientists believe that man manages to get rid of pesticide accumulations over a certain level, given a reasonable amount of time. Research on the long-term effects of pesticides on humans is virtually impossible; and it is extremely difficult to extrapolate research on animals to humans. So while there is no convincing

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evidence that pesticides seriously damage man, neither is there proof that they don't.

A number of scientific studies have linked pesticides and other chemical compounds with cancer. In early March it was reported that preliminary analysis of a large-scale study of 130 such compounds—conducted for the National Cancer Institute—indicates they are carcinogenic to mice (in very large doses). Pesticides are reportedly among the compounds under suspicion.

Other reports suggest that pesticides are a genetic hazard to man, capable of producing mutations, which are usually harmful. Dr. James F. Crow of the University of Wisconsin says, "There is reason to fear that some chemicals [including pesticides] may constitute as important a [mutagenic] risk as radiation, possibly a more serious one." Dr. Osny G. Fahmy of the Chester Beatty Research Institute in London says, "the amount of pesticide chemicals man is now absorbing from his environment is enough to double the normal mutation rate." He says they are capable of disrupting the DNA molecule; the effects are cumulative, and the mutations may not show up for generations. Dr. Marvin Legator of the Food and Drug Administration says the widely used and relatively nontoxic fungicide captan breaks chromosomes in mammalian cell cultures and may be capable of inducing mutations in man. Dr. M. Jacqueline Verrett, also of FDA, says such chemicals can cause birth deformities in chickens. *Medical World News* has reported that a great many genetics experts are concerned about mutagenic chemicals "as either a proved or at least a potential menace to human health. . . ."

Dr. Robert W. Risebrough of the University of California's Marine Resources Institute says consideration is not being given to the enzyme-inducing ability of pesticides. "No responsible person could now get up here and say that this constant nibbling away at our steroids (sex hormones) is without any physiological effect. It would be irresponsible."

None of these scientists claims to have *proved* any mass dire effects due to pesticides. But they are warning man that he should not be blind to the possibilities. Man was surprised, after all, when he found that the drug thalidomide could cause children to be deformed; that cigaret smoking could cause cancer; that simple X-rays could cause a skin ailment that didn't show up for decades; or that amounts of radiation presumed to be safe could apparently cause tumors in children more than 10 years later.

Pesticide poisoning

More obvious are the effects of pesticide poisoning in household, occupational and industrial accidents. "Each year," says a government study, "approximately 150 deaths are attributed to misuse of pesticides in the United States. About half of these occur in children who were accidentally exposed at home." It would be impossible to guess the number of nonfatal poisonings. But cases of occupational poisoning "have become more frequent," and "the adequacy of safeguards . . . is put in question by reviews of the effects of pesticides on human health."

In California alone in 1964, there were some 1328 reports of occupational disease attributed to pesticides and other agricultural chemicals. This has now become a major new issue in the long, bitter strike and boycott against California's table grape growers. The union argues that many cases of poisoning are not reported, and many others are mistaken for other illnesses because the symptoms are so similar. It has filed suit to halt the use of DDT in the state. In Mexico, 17 were killed and some 600 made violently ill in 1967 when parathion contaminated bread supplies. A week later, a truck loaded with parathion overturned and spilled the deadly pesticide over a California highway.

The ironies of it all

Aside from misuse and danger, the application of pesticides is likely to be fraught with irony and paradox—in fact, with failure. In the first place, it should be noted that agriculture, particularly in the U.S., has tended to spread single crops over larger and larger areas, sometimes over thousands of acres. Such monoculture is efficient and economical. But it is also an invitation to pests which thrive on a particular crop, especially since their natural enemies may no longer find the area to their liking. Such invitations, of course, have been answered with massive invasions.

Perhaps the greatest irony in pesticide use is the destruction of beneficial insects and rodents in addition to the target species. (There has been some limited success in developing pesticides with narrow, specific effects.) Thus the victims are likely to include the very natural enemies that have been holding the target pest in check. There are many cases in which pest populations have burgeoned anew as a result. Sometimes the destruction of parasites and predators simply clears the field for a surge of *several* new crop pests, compounding the problem of control.

A second is that pests have a perverse tendency to develop resistance to the poisons man lavishes on them. Says a Congressional report: "When a pest population, reproducing rapidly, is exposed to a lethal chemical, the laws of natural selection are dramatically demonstrated. The variety of genetic makeup, even within a single species, means that some insects in the population will have a biochemical mechanism for resistance and a new population will build up, unaffected. . . ." Then there is an inclination to increase the dosage, or shift to another perhaps more poisonous chemical, to kill off this tougher breed. But the report cautions that "there appears to be no toxicant powerful enough to kill every member of a large population."

There's another kind of "resistance." For example, Professor Walter Ebeling and Donald A. Reierson of UCLA write of cockroaches that learn to avoid hazardous insecticides even after the first contact, with the result that the most toxic substances may be the least effective.

WHERE DO WE GO FROM HERE?

What can be done to slow down the lavish use of pesticides, to protect wildlife, and to mitigate the risks to man? And, at the same time, to control harmful pests and protect valuable food and fiber? The next issue of CONSUMER REPORTS will review the present state of pesticide regulation, and explore improvements and alternatives to chemical control.

Pesticide Pollution

Part II. *The politics of pesticides*

Seven years after Rachel Carson's "Silent Spring" alerted the public to just how toxic some pesticides are and how carelessly they have been used, the pesticide market continues to boom. Last month, in part one of a two-part series, CU reviewed some of the reasons why responsible citizens and scientists are concerned about the threat of these widely used chemicals. This report reviews the present state of pesticide regulation and explores possible improvements both in pesticide regulation and in chemical control of insect pests. The series is an abridgement of a report that originally appeared in "CF Letter," a periodical published by The Conservation Foundation, an independent, nonprofit group concerned with environmental issues. Reprints of the entire report are available for 50¢ per copy from The Conservation Foundation, 1250 Connecticut Avenue, N.W., Washington, D.C. 20036.

There is a large, well-entrenched coalition in the United States that prides itself on the nation's superlative agriculture —and generally opposes attempts to restrict the use of pesticides. The coalition is composed of farmers, bureaucrats, legislators and, of course, the manufacturers and distributors of pesticides—an estimated $1.7 billion worth in 1969. At the forefront is the National Agricultural Chemicals Association, based in Washington, D.C., and including in its membership the large pesticide makers. Its public position is crystal clear: There's nothing wrong with pesticides if they are handled and used properly.

"Our basic philosophy," says Parke C. Brinkley, the chemical association's president, "is that there are some safe uses for all the products, and some unsafe uses. We don't think a total ban on a product is a very smart way of doing it. It would not be in the public interest." Why not? Because, it is insisted, there are particular uses and particular chemical compounds for which there is no good substitute. For example, DDT is considered cheaper and more effective in controlling many pests than other, less-harmful or less-persistent compounds.

Considering that, and the immediate potential saving to farm and forest owners, it is small wonder that they turn to pesticides and that broad attempts to limit the use of pesticides are opposed. But for all its seeming logic, that approach presents a problem. For it is already clear that pesticides often cause unintended and damaging side effects, including heavy losses of fish and wildlife. They adversely affect natural systems, and they may even pose a threat to man himself. But with factual knowledge on most pesticides still to come in, how does society measure and balance the risks of pesticides against their virtues in the meantime?

Federal regulation

Essentially, the Federal Government's regulation of pesticides is done on a piecemeal, or individual product-use, basis. The backbone of the process is the Federal Insecticide, Fungicide and Rodenticide Act, passed in 1947 and subsequently amended and interpreted at great length. That law controls *registration* and *labeling* of pesticide products. It is supplemented by provisions of the Federal Food, Drug and Cosmetic Act of 1938, also amended, under which the Food and Drug Administration is empowered to set "tolerance" levels for pesticide residues in raw agricultural commodities, to confiscate them if the pesticide content exceeds authorized levels, and even to initiate prosecution. Both Federal acts apply only to pesticides on food marketed in interstate commerce.

The Federal insecticide act is administered by the U.S. Department of Agriculture's Pesticides Regulation Division. A manufacturer or shipper must apply for registration and labeling of a particular product to be used for a particular purpose. Although there are only 900 or so basic chemical compounds, there are some 45,000 pesticide registrations, including those for household use. An approved label will prescribe conditions of use, target, dosage, method and timing of application, etc., as well as pertinent warnings. Approved uses are determined by the U.S. Department of

Agriculture, based on its own research and review of data supplied by the manufacturer. That information deals with efficacy and toxic effects, among other things.

Applications for registration are reviewed by the Food and Drug Administration if food is involved, and FDA has the power to block approval if it finds the proposed use of the pesticide is likely to result in a residue in food or feed exceeding the tolerance level. Applications are also reviewed by the Federal Health, Education and Welfare Department's Consumer Protection and Environmental Health Service under its mandate to protect drinking water and long-term environmental health. And they are reviewed by the Interior Department if a pesticide use might affect fish or wildlife. Both the Health Service and Interior can only *advise* the Department of Agriculture; that is the limit of their authority.

That limited authority presents certain problems. For example, the U.S. Department of Agriculture first registered the insecticide lindane for use in vaporizers in 1950. Recently, the U.S. Comptroller General scored USDA for permitting that use of lindane in food-handling and other commercial and industrial establishments—despite the fact that the Public Health Service and other Federal, state and private organizations have long contended it is dangerous to health and food. On April 29, USDA cancelled the registration of lindane for use in vaporizers. USDA explained that "intensified" studies since the Comptroller General's report showed lindane vapors caused "undue risk to . . . health" and that simulated restaurant tests showed "illegal residues of lindane" in "practically all food, packaged and unpackaged," after five days' exposure.

Officials of both Interior and Agriculture generally say that cooperation is good, and that Interior's recommendations are almost always accepted. However, Dr. Frederick H. Dale, chief of the Division of Pesticide Registration of Interior's Bureau of Sport Fisheries and Wildlife, adds that there is no formal follow-up procedure and "we're never positive Agriculture hasn't disregarded our warning." Ned P. Everett, counsel to the House Merchant Marine and Fisheries Committee, says evidence shows that some labels recommended by Interior have been "toned down considerably" by Agriculture. A continuing effort has been made in Congress to *require* Agriculture to take Interior's labeling advice to prevent or minimize injury to fish and wildlife. In fact, the House on April 1, 1968, passed a bill containing such a provision. However, it did not emerge from the Senate Commerce Committee, where it was opposed by the National Agricultural Chemicals Association and the Agriculture Department. A similar provision is contained in a new bill introduced this year, H.R. 1057.

Attempts to strengthen pesticides regulation do not normally fare well in Congress, where the four committees or subcommittees dealing with agricultural legislation and appropriations are dominated by farm-oriented Congressmen. For example, bills to ban the interstate shipment of DDT have been referred several times to the Senate Agriculture and Forestry Committee, which one observer calls a "dead end" for that kind of proposal. Another example involves a bill introduced in several sessions by Senator Abraham Ribicoff of Connecticut. It would give Agriculture more muscle by requiring a pesticide manufacturer to register his *establishment* and by permitting Agriculture to inspect it to see if proper materials are being used and if proper precautions and controls are being followed, and to inspect a warehouse or vehicle carrying pesticides.

But, as the National Agricultural Chemicals Association's Brinkley reported to his membership: "Through the understanding of Congress, and particularly Senator Jordan of North Carolina [chairman of the subcommittee to which the bill was referred], we have been given some time to see if the situation might be improved without the necessity of federal intervention." Brinkley said that compromise was "entirely acceptable to us."

Even as they stand, the laws are not necessarily administered well. Some observers give the Food and Drug Administration good marks for its system of residue tolerances on food. Others do not. Douglass F. Rohrman, an attorney formerly with the Health, Education and Welfare Department's National Communicable Disease Center, says that a significant amount of work has never produced a truly complete set of standards. Dr. Paul Ehrlich of Stanford University says that most FDA tolerances are set "on the basis of short-term animal experiments and are set one poison at a time. Then, when it proves to be impossible to keep tolerances within limits, pressures are brought on the Government, and the tolerances are conveniently raised." Speaking of enforcement, one FDA official says "our programs are minimal in this area. They could be strengthened." He also says that although there have been many seizures of food, he knows of no case of criminal prosecution.

The situation in the Agriculture Department is another story. Under Federal law, the Pesticides Regulation Division, a branch of the Agricultural Research Service, can act against a pesticide product if it is unregistered, misbranded or adulterated. In addition to the issuance of a written warning, the Pesticides Regulation Division has power to seize such products, cancel their registration, or ask the Justice Department to prosecute for criminal violations. How has this regulatory program worked? Consider these blunt charges in a recent report by the Government's watchdog General Accounting Office:

- For 13 years, the Agricultural Research Service never reported a violator of the Federal insecticide act for prosecution—that despite "repeated major violations" of the law. (A number of shippers were cited for between four and 20 major violations each.)
- Shippers cited by the service "did not take satisfactory action to correct violations," and in fact "ignored" notification that prosecution was being contemplated.
- "We found that, in taking action against products, the

PESTICIDE POLLUTION continued

Service, with a few possible exceptions, did not obtain product quantity and location data to determine whether other shipments of the same misbranded, adulterated or unregistered products were available to the public in other locations."

- In fiscal 1966, the Service tested and reviewed 2751 product samples and found 750 of those to be in violation (562, or about 20 per cent of the samples, in major violation). There were 106 seizures.

In May, the House Government Operations Subcommittee on Intergovernmental Relations held a hearing to follow up the General Accounting Office's report. Among the disclosures reported by *The Washington Post:* "The law has permitted recalls of unsafe products since 1947—but procedures for recalls were not approved until [May 12, 1969]. The first recall was in September, 1967."

Speaking of recalls, and casting further light on the effectiveness of the Agricultural Research Service's safety procedures, the General Accounting Office report relates the history of 58 products containing thallium, which was used to kill rats and insects in homes. "A number of deaths had occurred, principally in children, as a result of accidental consumption of the bait material." So in June, 1960, the Agricultural Research Service "took action to limit the thallium content of products in an attempt to reduce the possibility of fatal accidents. . . . In spite of the limitation, deaths continued to occur. . . . In addition, statistics of the Public Health Service indicated that there were about 400 reported cases of thallium poisoning of children during 1962 and 1963." Effective September, 1965, the Agricultural Research Service cancelled the registrations of all thallium products. But, said the General Accounting Office, that action was not supplemented by efforts to find out about the products already on the shelves. Thus, it said, thallium products were found to be still available to the public in January, 1968. Possibly some still are.

Perhaps complicating the picture is the presence of several basically conflicting purposes within Agriculture. For one thing, the department's principal responsibility is to the farmer and food production, and Congress wouldn't let it forget that if it wanted to. So there is a potential conflict of interest simply in having pesticide regulation within the Agriculture Department. On the other hand, there exists a clear pesticide policy memorandum in the Agriculture Department, issued by former Secretary Orville Freeman on December 23, 1964. It expresses concern over the effects of pesticides and states that department policy is "to practice and to encourage the use of those means of effective pest control which provide the least potential hazard to man and animals. When residual pesticides must be used to control or eliminate pests, they shall be used in minimal effective amounts, applied precisely to the infested area and at minimal effective frequency. Biological, ecological or cultural methods or nonpersistent and low toxicity pesticides will be used whenever such means are feasible and will safely and effectively control or eliminate target pests."

But there is a generally cozy relationship between the agricultural industry and various branches of Government, some of whose officials end up working for industry. That coziness is not exactly discouraged by Congress. Congressman Jamie L. Whitten of Mississippi, chairman of the House Appropriations Subcommittee on Agriculture, says that farmers must look to the Department of Agriculture to represent their interests. "If the Department does not appear on behalf of the farm producers at hearings [on pesticide residues] as to whether it is essential on the one side and to question whether it does any injury . . . we are in a bad way."

State regulation

All states except two have registration laws covering pesticides distributed in intrastate commerce. Most of those laws are modeled after the Federal Insecticide, Fungicide and Rodenticide Act and a uniform act prepared by the Council of State Governments. But though the Federal act and those state laws govern labeling and the *prescribed* use of a pesticide, they do not restrict *actual* use after a pesticide is sold. The Food and Drug Administration's residue tolerances are indirect restraints on excessive use of pesticides. They place a "natural restriction" on the farmer, says an aide of the National Agricultural Chemicals Association. "If he overuses, there will likely be an excessive residue on the crops and they'll be seized. A grower can't risk his entire crop that way."

But some question the impact of FDA's regulatory program. Stanford University's Dr. Ehrlich, for example, says that inspection of foods for residues is "completely inadequate," and that farmers have not infrequently sprayed beyond official tolerances "knowing that the chances of being caught were practically nil." Most states have their own tolerances for commodities sold intrastate, and they generally parallel the FDA's. There is no telling how much abuse or misuse of pesticides takes place, be it from misinformation, carelessness, or overzealousness. But dozens of cases have been cited, and the comment of Dr. Dale of the Interior Department is apt: "I hope there's not as much as I'm afraid there is. . . . We can put a warning on the label, but . . . we can't hold [the farmer's] hand and see that he uses it that way."

Directed specifically at misuse of pesticides are the so-called "use and application" laws enacted by many states. Those may regulate specific uses, inspection of equipment, and licensing of operators, dealers and applicators, including aerial applicators. In California, for example, the Department of Agriculture establishes rules and regulations for the use of several "injurious" or "restricted" categories of chemicals. Before using certain chemicals, the prospective user (farmer as well as commercial applicator) must obtain a permit from his county agricultural commissioner, who may include on the permit any conditions he considers necessary to assure safety. Before delivery, the seller must obtain from the purchaser a signed statement that the appropriate permit has been secured.

Some state laws are extremely limited in scope. Some deal only with herbicides, others only with "structural" termite control. Enforcement is a problem too, with effectiveness varying as much as the laws themselves. And as in all regulatory programs, enforcement is only as effective and vigorous as the people carrying it out.

State legislatures and agencies, of course, are subject to the same economic and political pressures and dilemmas, the same latent conflicts of interest, as Congress and Federal agencies. Almost all states have placed pesticide regulation under their agriculture departments. Sometimes there is even a reluctance to supply information on pesticide use. Recently, a Washington, D.C., city official simply declined to answer when he was asked how much DDT was being used on the city's trees.

Still another opportunity for regulation of pesticide use is provided by the water quality standards program, which states are carrying out in cooperation with the Department of the Interior's Federal Water Pollution Control Administration. Most state standards, which have to be approved by Interior, generally require that waters remain free from toxic substances in concentrations that would be harmful to man, fish or wildlife.

Alternatives for the future

1. Natural or "biological" controls of insects and diseases offer what are undoubtedly the most promising ways of gradually replacing pesticides. Those methods are of great variety and potential. Natural predators or parasites of the target insect often can be introduced in an area. For example, the press has reported that Citizens for Clean Air, a private organization opposed to use of chemical pesticides, recently released 300,000 ladybugs in a 20-block park area in New York City. Ladybugs feed on aphids and a wide variety of similarly destructive lice, scales, borers and their eggs. A bacteria or virus that is ruinous to the target pest alone can be introduced. Males of some target species can be sterilized in vast numbers and then released. They mate with females but produce no offspring; the population may thus be lowered dramatically. Many insects are attracted sexually by substances that can be made synthetically. Those attractants are used to trap or confuse the targets. Similarly, food attractants can be used to induce pests to eat poison. Sound and light can be used to attract or repel insects. And light can be used, in minute exposures, to disrupt an insect's timing—making it think, for example, that spring has arrived and inducing it to emerge into a cold or otherwise hostile environment. There are also methods of genetic manipulation (even to the point of introducing into the population insects carrying lethal genes), and hormonal control (to promote excessive growth, disrupt the life cycle, etc.). A Czechoslovak chemist has reported the synthesis of a hormone-like substance that imparts sterility to some bugs—and is *contagious* to them. Many crop varieties have been developed that simply resist attack from particular insects or disease.

The Agriculture Department, in fact, has shifted a major portion of its research funds over the years from chemical to biological controls. The chemical industry, of course, is not likely to do so. "For the most part," says a Congressional committee, "biological control can only be considered a threat to some portion of the pesticide market." In fact, industry has been accused of shaping or dominating pest-control research. Rachel Carson noted in "Silent Spring" that many of the best entomologists labor in the "more exciting vineyards" of *chemical* control. She suggested that that was because major chemical companies were "pouring money into the universities to support research on insecticides."

2. So-called cultural methods of control can also be useful. Those include rotating crops and reducing areas of monoculture, to encourage more predators and fewer harmful insects; better timing of crops to avoid emerging insect populations; and more appropriate plant spacing, soil preparation and tillage, water and fertilizer management and sanitation.

3. Even when insecticides are used, techniques can often be improved. Careful timing and minimal applications can produce better results at less cost—both to the user and the environment. Pesticides can be used, or developed, that are more selective and cause minor damage to beneficial insects and fish or wildlife. One new technique is called ultralow-volume aerial spraying. Undiluted insecticide is sprayed in a very fine mist. As little as one ounce per acre may be needed, and one plane load can cover a large farm or forest area inexpensively.

4. Many experts believe that the real answer lies in integrated pest control programs—those that make maximum use of biological and cultural methods as well as selective application of pesticides when necessary as supplements.

5. Avoidance of economic loss does not necessarily require the eradication of a pest. Dr. William A. Niering, professor of botany at Connecticut College, says the farmer is forced to seek total eradication "by those demanding from agriculture completely insect-free produce. This has now reached ridiculous proportions. Influenced by advertising, the housewife now demands perfect specimens with no thought of or regard for how much environmental contamination has resulted to attain such perfection."

6. It has been suggested by many scientists and legislators that DDT, or all so-called "hard" pesticides, be banned entirely. Actually, there have been a number of steps in that direction. Some states and communities have banned DDT for certain uses, such as treating Dutch elm disease or mosquito control. Pending a study, Arizona has a one-year prohibition on DDT use in commercial agriculture; in Wisconsin hearings have been held on a petition to ban DDT altogether; and Michigan has moved to make the sale of DDT illegal.

The California state legislature is considering a ban on DDT, and early in June *The New York Times* reported on an open letter signed by 60 West Coast marine scientists and addressed to Governor Ronald Reagan and the people of California. In supporting such a ban, the scientists said: "The scientific evidence now available shows beyond question that DDT and its residues have caused serious and irreparable damage to populations of beneficial birds and fishes. It is true that since World War II, DDT has saved millions [of lives] . . . and billions of dollars. . . . However, DDT is no longer an essential weapon in the battle for human health and food. It is less effective than it once was, for nearly 150 species of insect pests have developed resistance to it, and many other pesticides that are less destructive . . . are now available to take its place."

Sweden just became the first nation to declare an outright

PESTICIDE POLLUTION continued

ban on DDT (for at least two years)—apparently spurred in part by an international conference in Stockholm at which scientists stated they couldn't be sure DDT was *not* harming humans. On April 1, Senator Gaylord Nelson of Wisconsin again introduced a bill (S. 1753) to prohibit the interstate sale or shipment of DDT in the U.S. Congressmen Bertram Podell of New York and Joseph Karth of Minnesota have offered similar bills in the House.

7. Greater research is needed. The President's Science Advisory Committee has said that it is "well within the capacity of the chemical industry, which annually screens some 100,000 new organic compounds as potential pesticides, to develop biodegradable pesticides of suitably narrow spectra of action."

8. Even the best information is of no use buried. "One of our major problems," says Connecticut College's Dr. Niering, "is the communication of sound ecological knowledge already available. . . . The problem really challenging man is to get this scientific knowledge translated into action. . . ." The President's Science Advisory Committee believes "all data used as a basis for granting registration and establishing tolerances should be published, thus allowing the hypotheses and the validity and reliability of the data to be subjected to critical review by the public and the scientific community."

9. The Science Advisory Committee has also suggested a more cautious approach to registration of pesticides: "Unless a pesticide proposed for registration is equally effective in a less hazardous way than methods already available, [we] believe registration should be considered conservatively. As a corollary . . . more hazardous compounds might well be removed from the market when equally effective and less hazardous substances are found."

10. New or stronger Federal and state laws governing registration and labeling, use and application could be enacted and enforcement could be improved. Among possible administrative changes is the transfer of pesticide functions from agricultural agencies to those concerned with health or the environment; and the creation of independent, policy-making pesticide review boards, which some states in fact already have. Also recommended by some is the regional approach illustrated by the four-state agreement between the natural resource agencies of Illinois, Indiana, Wisconsin and Michigan, designed to stem the flow of persistent pesticides into Lake Michigan.

On April 14, Senator Nelson introduced a bill (S. 1799) to establish a permanent, 12-member National Commission on Pesticides. It would be responsible for evaluating the present usage of pesticides, reviewing existing use and labeling restrictions, recommending safety standards for pesticides in water, developing a monitoring program, conducting or initiating research of all kinds, and making recommendations to the President and Congress on the elimination or limitation of pesticide use.

11. Greater accountability has been suggested. For instance, Dr. Robert L. Rudd of the University of California recommends that we "require public justification of any tax-supported control program and insist that this justification contain a clear description of the purposes of the control program, the methods by which it is to be conducted, the hazards inherent in it, and economic or social gains that justify both costs and hazards."

12. Broader training of commercial applicators and others is also needed. Dr. Rudd proposes a "user education" program "in which the full range of hazards of chemical use is explained." He says "it is not enough to seek to educate growers and appliers in the proper methods of handling toxic chemicals. They must also be told the biological and social consequences of continuing chemical use."

13. The pesticides problem seems tailor-made for the kind of oversight, review and judgment that could be provided by a Council of Environmental Advisors—a highly qualified group at the top level of the Executive Branch. Such a council is called for in several bills now pending in Congress. Control of pesticide pollution is a massive and complex problem. It involves both interagency and Federal-state coordination. It requires the resolution of divergent scientific views. And it involves conflict betwen different economic and social interests.

14. Few, if any, improvements will be achieved without strong citizen interest and action. Traditional pesticide practices are cemented by traditional bureaucratic and political alliances, and by traditional scientific and economic considerations. Citizen and conservation organizations can play key roles in focusing public, legislative and administrative attention on the pesticides problem. The Citizens Natural Resources Association's petition for a ban on DDT in Wisconsin was the subject of a hearing that was held there. Similarly, the Michigan Audubon Society initiated a court suit in 1967 that led at least indirectly to restrictions on the use of DDT in that state.

OCCUPATIONAL DISEASE IN CALIFORNIA ATTRIBUTED TO PESTICIDES AND OTHER AGRICULTURAL CHEMICALS

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH
BUREAU OF OCCUPATIONAL HEALTH

1966

SOURCE OF DATA

When an injured employee requires medical attention other than ordinary first aid treatment, the attending physician must file a report, the *Doctor's First Report of Work Injury*, with the Division of Labor Statistics and Research in the California Department of Industrial Relations (*State of California Labor Code*, 1965, Section 6407). The employer also files a report, the *Employer's Report of Industrial Injury*. By definition, work injury includes occupational disease.

Under interagency agreement, doctors' reports of occupational disease for a selected list of disease conditions are routed by the Division of Labor Statistics and Research for review by the Bureau of Occupational Health of the California Department of Public Health.

COVERAGE

This report deals with occupational disease attributed to pesticides and other agricultural chemicals as reported for the 80 percent of the 7.2 million employed persons in California covered under the California Workmen's Compensation law in 1966. Among those excluded are federal employees, maritime workers, railroad workers in interstate commerce and the self-employed.

This report prepared by

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SUMMARY

The 1,347 reports of occupational disease attributed to pesticides and other agricultural chemicals received in 1966 compares with 1,340 in 1965 and 1,328 in 1964.

Occupational diseases are not included from among self-employed farmers and unpaid family labor, 28 percent of the agricultural work force, and from self-employed one-man operations in structural and agricultural pest control work. Data in this review, therefore, undoubtedly understate the incidence of occupational disease attributed to pesticides and other agricultural chemicals.

The rate of occupational disease from agricultural chemicals in agricultural services (6.6 reports per 1,000 workers) was nearly twice that for workers in all agriculture (3.5 reports per 1,000 agricultural workers).

Since 1951, there have been 32 occupational fatalities implicating agricultural chemicals. In this same period, 82 children and 22 other adults died in California from accidents attributed to pesticides and other agricultural chemicals, a total of 136 accidental deaths.

Organic phosphate pesticides were implicated in 19 percent of the 1,347 reports in this series; followed by herbicides, 11 percent; fertilizers, 10 percent; halogenated hydrocarbon pesticides, 7 percent; and phenolic compounds, 7 percent.

There were 233 reports of systemic poisonings in 1966. The organic phosphate pesticides were blamed in 173 of these.

Forty percent of workers with occupational disease attributed to agricultural chemicals were expected to lose some time from work. Ten percent of such workers were hospitalized.

Farm laborers accounted for more than half (704) of the 1,347 reports of occupational disease attributed to agricultural chemicals; nonfarm laborers, 15 percent; and operatives, including truck and tractor drivers, 14 percent.

Eighty percent of pest control chemicals moved beyond local areas are moved by truck. Chemicals are usually transported in concentrated form, creating potential health hazards in transportation and storage of pesticides in the event of mishap.

BACKGROUND

Occupational disease caused by agricultural chemicals continues to be one of the most important occupational health problems in the State. Diseases caused by these chemicals include a high proportion of serious acute illness. In 1966, 42 percent of the 557 reports of all occupational poisonings were attributed to agricultural chemicals, although only 5 percent of the 27,626 reports of all occupational diseases received were attributed to these chemicals. Further, these cases are concentrated in the agriculture industry which has the highest rate of occupational disease in California: 11.9 reports per 1,000 agricultural workers in 1966, or more than two and a half times that for all industrial divisions (4.5 per 1,000 workers for all industry).

The acute effects of pesticides and other agricultural chemicals on workers in California, as recognized and reported by physicians, have been summarized by the Bureau of Occupational Health of the California Department of Public Health since 1950. While limited to the segment of the population covered by the California Workmen's Compensation law, these data are the only regularly available information in the United States on acute conditions caused by agricultural chemicals. As such, they have been of continuing interest to persons concerned with the effects of agricultural chemicals on the health of people. Although the use of pesticides and other agricultural chemicals is widespread in home and garden, the effects of this contact on the health of the general population are not completely known.

Comments in earlier reports of the Bureau of Occupational Health pointed to needed improvements for the protection of workers using agricultural chemicals. These comments still apply, as demonstrated by a review of the 1966 doctors' reports. Among the needed protective measures are: provision of washing facilities for farm workers in the fields; adequate supervision of agricultural chemical users; improvement in the engineering of crop-dusting aircraft and related equipment; and standardization of labeling on pesticide containers. As recently as the summer of 1967, an outbreak of pesticide poisoning in the San Joaquin Valley was reported to have sickened about 25 peach pickers. Yet similar outbreaks among fruit pickers had occurred there in 1959 and 1963.

DEFINITIONS

The terms pesticides and other agricultural chemicals as used in this review include such materials as insecticides, herbicides, rodenticides, fungicides, defoliants, fertilizers, hormones, soil additives, and wood preservatives, which

are commonly used to promote growth or to destroy plant or animal life. Occupational disease arising from exposure to these materials occurs in agricultural pursuits and such nonagricultural activities as structural pest control, wood treatment, manufacture, transportation and distribution of the chemicals. Data concerning occupational disease are, therefore, included for both the agricultural and nonagricultural industries.

For classification of occupational disease conditions reported by physicians, the term systemic poisoning refers to generalized illness caused by a toxic substance in which signs and symptoms are present in more than one system of the body. Reported cases are classified to respiratory condition if signs and symptoms are limited to the respiratory tract. Skin condition refers to a morbid reaction of the skin; burns and abrasions are excluded from this category. Eye condition refers to any condition of the eye caused by a chemical substance, and chemical burn is the corrosive destruction of tissue caused by contact with a chemical. Generalized allergic manifestations or signs and symptoms limited to any other single system of the body are assigned to the category other and unspecified. Beginning in 1964, eye conditions and chemical burns were included in the review for the first time in many years.

INCIDENCE

The 1,347 doctors' reports of occupational disease attributed to pesticides and other agricultural chemicals received in 1966 compares with 1,340 reports in 1965 and 1,328 in 1964. Although still high, the number of reports appears to be leveling off beginning in 1960. This trend was interrupted by an increase in 1963 when an outbreak of parathion poisoning occurred among peach pickers in the San Joaquin Valley. Similar outbreaks among citrus fruit pickers took place in 1959 (Table 1).

Reports of occupational disease are received only for wage and salary workers covered under the California Workmen's Compensation law. Thus, such diseases among self-employed farmers and unpaid family labor, 28 percent of the agricultural work force, are not included. There are also many self-employed one-man operations in structural and agricultural pest control work, at high risk from pesticides, for whom occupational disease reports are also not received. Data in this review, therefore, undoubtedly understate the incidence of occupational disease attributed to pesticides and other agricultural chemicals.

Rates of occupational disease reports attributed to agricultural chemicals have been computed for selected industries by relating the number of occupational disease reports for a given industrial category to the estimated annual average wage and salary employment for the same group. Occupational disease rates

are based on all occupational disease reports, both lost time and nonlost time. They are not comparable with work injury rates prepared by the Division of Labor Statistics and Research of the California Department of Industrial Relations for lost time work injury only.

REPORTS OF OCCUPATIONAL DISEASE ATTRIBUTED TO AGRICULTURAL CHEMICALS PER 1,000 WORKERS CALIFORNIA, 1966

WORKERS	REPORTS PER 1,000 WORKERS
Agriculture	3.5
Farm Laborers (Including Foremen)	3.3
Agricultural Services	6.6
Structural Pest Control Operators	10.6
Mosquito Abatement Districts	a

[a] Employment and number of reports are too few to compute a meaningful rate.

Source: Reference Tables 7 and 8.
Employment estimates from following State of California agencies: Department of Employment; Division of Labor Statistics and Research; Department of Public Health, Bureau of Vector Control.

Workers in agricultural services had a rate nearly twice that for workers in all agriculture. The 6.6 reports per 1,000 workers in 1966 was an increase of 8 percent over 1965 (6.1). The rate for structural pest control continued at a high level, 9.4 reports per 1,000 workers in 1965 and 10.6 in 1966.

Employees of mosquito abatement districts handle large quantities of agricultural chemicals and risk high exposure as a result. Seven reports were received for this group in 1966, 4 in 1965, and 8 in 1964, but the estimated number of workers employed was also small, an average of 600 in each year.[1]

These rates give some indication of relative risk, subject to the limitation that the number of workers actually exposed to agricultural chemicals is unknown, and may be considerably fewer than the estimate on which the rate is based. For example, most reports for workers in agricultural services came from pest control operators servicing farms. If the number of workers employed by these operators were known, the rate for pest control work, apart from other agricultural services, would be considerably higher.

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[1] State of California, Department of Public Health, Bureau of Vector Control, Private communication.

FATALITIES

Since 1951, there have been 32 occupational fatalities implicating agricultural chemicals. Thirteen of these were attributed to organic phosphate pesticides, 7 to methyl bromide, and 12 to such diverse agricultural chemicals as chlorate metaborate, anhydrous ammonia, sodium arsenate, pentachlorophenol, carbon tetrachloride, nicotine sulfate and paraquat (Table 2). In this same period, 82 children and 22 other adults died in California from accidents attributed to pesticides and other agricultural chemicals, making a total of 136 accidental deaths.

In 1966, there were 8 accidental deaths, including those of 3 workers, and 18 suicides in which it was officially determined that an agricultural chemical was the agent (Table 3). A description of two occupational fatalities from poisoning follows:

> One fatality involved parathion. After spraying peach trees with parathion all the preceding day and for three and a half hours that day, a young farm laborer of 28 became acutely ill at noon. This was reportedly the first time he had worked with parathion, although he had been employed as sprayer for 3 years. There was conflicting information about protective measures used. He wore an approved respirator. Sixty milligrams of parathion were extracted from one of his gloves and 2 milligrams from a patch on his trousers. Seven days after the exposure he died of complicating bronchopneumonia brought on by his severe parathion poisoning, confirmed by cholinesterase tests. Parathion, like other phosphate ester pesticides, is readily absorbed through the unbroken skin as well as by inhalation or ingestion of contaminated materials.
>
> Another farm worker who died was spraying the herbicide, paraquat. He carried two identical containers on the tractor, one containing the herbicide, the other his drinking water. He took a drink from the wrong container.

Warnings have been issued by the Bureau of Occupational Health that pesticides should be kept in their original labeled containers and "empty" containers should never be discarded where others can use them or children could reach them. They should be decontaminated, buried at an authorized dump, or burned. Recently, in 1967, reports have been received of a California farm worker who died after drinking parathion which had been placed in a plastic Clorox-type container, thinking it was water, and of four men who died because they drank from a wine bottle in which an arsenical herbicide had been mixed.

SUMMARY OF 1966 DATA

GEOGRAPHIC DISTRIBUTION

Reports came from 50 of California's 58 counties. As in past years, many of the reports (38 percent) were from the San Joaquin Valley.

CHEMICAL AND CLINICAL TYPE OF DISEASE

Organic phosphate pesticides were implicated in 19 percent of the 1,347 reports of occupational disease attributed to agricultural chemicals; followed by herbicides, 11 percent; fertilizers, 10 percent; halogenated hydrocarbon pesticides, 7 percent; and phenolic compounds, 7 percent. Other specified chemicals accounted for 14 percent of the total, and in 33 percent of the reports the chemical was not identified.

As in other years, skin conditions, eye conditions, systemic poisonings and chemical burns, in that order, were the most commonly reported of the occupational diseases in this series.

There were 233 reports of systemic poisonings in 1966, nearly one and a third times as many as in 1965 (179). The organic phosphate pesticides were blamed in 74 percent of these, although they accounted for but 19 percent of all occupational diseases from agricultural chemicals. Parathion, as usual, was the most frequently identified chemical, with 102 reports, followed by Phosdrin, malathion and Systox.

The halogenated hydrocarbon pesticides are the most widely used, and these chemicals accounted for 94 reports. With the exception of methyl bromide, carbon tetrachloride and endrin, pesticides in this group generally cause less acute illness among people than the organic phosphates. There were 40 reports attributed to the DDT, chlordane, lindane group, and 30 to methyl bromide. No reports involving carbon tetrachloride used as an agricultural chemical were received in 1966; there was 1 report in 1965; 2 in 1964.

The fungicide, sulfur, was named as agent in 75 occupational disease reports. Of these, 33 were skin conditions and a like number eye conditions; 5 were chemical burns. Although these three classes of occupational disease do not usually cause a loss of time from work, 45 percent of the workers with conditions attributed to sulfur were expected to lose some time from work. (Sulfur was grouped with other specified agricultural chemicals in previous reports.)

TIME LOST FROM WORK AND HOSPITALIZATION

The severity of illness caused by agricultural chemicals is indicated by the greater frequency with which workers were expected to lose time from work with such illness, as well as by the greater frequency with which they were hospitalized, compared with occupational illness from all causes. As used in this review, the term *hospitalization* excludes treatment solely in the hospital emergency room or outpatient department.

Forty percent of workers with occupational disease attributed to agricultural chemicals were expected to lose some time from work, nearly twice the proportion as for all agents. Ten percent of such workers were hospitalized, almost three times the proportion of those hospitalized for illness from all causal agents.

For illness attributed to organic phosphate pesticides, physicians advised their patients to take time off from work even more frequently than for all agricultural chemicals, and found it necessary to hospitalize more than 1 in 4 of these patients. Most such workers were expected to be back on the job within a week. Organic phosphate pesticides can cause serious illness; however, within 48 hours the patient is usually dead or well on the way to recovery. Although recovered and able to work, the worker should not have to handle or be exposed to phosphate esters until his cholinesterase level returns to normal.

ESTIMATED TIME LOST FROM WORK AND HOSPITALIZATION	TOTAL OCCUPATIONAL DISEASE	OCCUPATIONAL DISEASE ATTRIBUTED TO AGRICULTURAL CHEMICALS			
		Total	Organic Phosphate Pesticides	Methyl Bromide	Sulfur
Total	100.0 (27,626)	100.0 (1,347)	100.0 (253)	100.0 (30)	100.0 (75)
Estimated Time Lost From Work					
Time lost from work	22.8	40.1	58.5	50.0	45.3
No time lost from work	62.8	45.8	25.3	33.3	37.3
Not stated	14.4	14.1	16.2	16.7	17.4
Hospitalization					
Hospitalized	3.5	10.0	28.1	40.0	2.7
Not hospitalized	96.3	89.8	71.5	60.0	97.3
Not stated	0.2	0.2	0.4	-	-

Source: Reference Table 9.
State of California, Division of Labor Statistics and Research, *Doctor's First Report of Work Injury.*

As indicated in the text table, other agricultural chemicals such as methyl bromide and sulfur also had a disproportionately high percentage of disease conditions resulting in hospitalization or other work disability.

AGE AND SEX

Women accounted for less than 10 percent (121) of the 1,347 reports, about the same as in the past. Median age of all workers with reported occupational disease was 35.5 years.

INDUSTRIES INVOLVED

Occupational disease among workers in the agriculture industry accounted for 820 of the 1,347 reports (61 percent). Agriculture includes not only livestock and crop farming, but also such services to farms as cotton ginning, spraying and other horticultural and husbandry services. Spraying and pest control not connected with agricultural services are listed separately. Most reports concerned workers on farms, but 137 were employed in agricultural service industries, mainly pest control operators servicing farms.

Data in this review undoubtedly understate the incidence of occupational disease from pesticides and other agricultural chemicals in agriculture. The experience of the 90,000 self-employed farmers and unpaid family labor, 28 percent of those working in agriculture,[1] who also use agricultural chemicals, is not included and is unknown.

There were 222 agricultural aircraft operators licensed in California to use aircraft in pest control work in 1966.[2] Employees of 47 operators accounted for 74 reports of occupational disease attributed to agricultural chemicals, about one and a half times as many as were received in 1964 and 1965. The increase was in reports of systemic poisonings, nearly all of which identified organic phosphate pesticides as responsible. Swampers, flagmen, mixers and other laborers were the most frequently affected. Ten were pilots. Of the 74 ill workers, 31 were under the age of 20; 2 were reportedly 15 years old.

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1 Estimated total of 323,600 persons working on farms and in agricultural services. Source: State of California, Department of Employment, *California Annual Farm Labor Report, 1966,* and Division of Labor Statistics and Research, Private communication.

2 State of California, Department of Agriculture, *Agricultural Pest Control Operators, 1966* (Announcement Numbers PC-187, PC-192, and Announcement September 7, 1966).

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REPORTS OF OCCUPATIONAL DISEASE ATTRIBUTED TO AGRICULTURAL CHEMICALS BY CLINICAL TYPE OF DISEASE, AGRICULTURAL AIRCRAFT OPERATORS CALIFORNIA, 1960-1966

YEAR	TOTAL	EYE CONDITION	CHEMICAL BURN	SYSTEMIC POISONING		OTHER CONDITION
				Total	Attributed to Organic Phosphates	
1960	101	a	a	78	na	23
1961	55	a	a	40	na	15
1962	32	a	a	23	20	9
1963	36	a	a	28	22	8
1964	50	10	2	25	20	13
1965	48	8	1	26	23	13
1966	74	10	2	49	46	13

na Not available.

a Categories not included in total statistics for this year.

Source: State of California, Division of Labor Statistics and Research, *Doctor's First Report of Work Injury.*

Nonagricultural industries contributing large numbers of reports were manufacturing, 15 percent; State and local government, 6 percent; and trade and construction, each with 4 percent of the total. Most of the 204 reports from manufacturing industries came from chemical companies, generally, those specializing in agricultural chemicals, from food processors and from lumber and wood products companies. School districts accounted for 25 of the 86 reports from government; the reports concerned mainly gardeners and maintenance men.

Structural pest control work, a high risk category, has many self-employed one-man operations whose occupational diseases are not covered by the California Workmen's Compensation law. There were over 1,000 licensed structural pest control operators in 1966[1] employing an average of 3,091 workers.[2] These employees accounted for 33 cases of occupational illness attributed to pesticides and other agricultural chemicals. Skin and eye conditions predominated, and 8 of the 33 reports implicated halogenated hydrocarbon pesticides.

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1 State of California, Structural Pest Control Board, Private communication. There were 1,061 licensed structural pest control operators for fiscal year 1965-1966, 1,094 for fiscal year 1966-1967.

2 State of California, Department of Employment, Private communication.

OCCUPATION

Almost all occupational groups were represented, but farm laborers, as usual, accounted for more than half (704) of the 1,347 reports of illness attributed to pesticides and other agricultural chemicals. Organic phosphate pesticides were blamed in 22 percent of reports concerning farm laborers; herbicides, 11 percent; sulfur, 8 percent; and fertilizers, 7 percent.

More than 40 percent of the 704 farm laborers had a Spanish surname. This proportion continues high even though foreign contract laborers, mainly from Mexico, have been reduced to insignificant numbers in the last two years.[1] Many of these workers are known to have language difficulties. Employers of non-English speaking workers are required to provide work instructions in the language spoken by the employees.[2]

Nonfarm laborers, such as gardeners, warehouse and plant workers, accounted for 199 reports, 15 percent of all cases. The most frequently identified agents for this group were herbicides, phenolic compounds, organic phosphate pesticides and fertilizers.

Operatives, the third largest occupational category, made up 14 percent of the total. Among the 190 reports for operatives, 38 implicated organic phosphate pesticides; 34, fertilizers; and 16, halogenated hydrocarbon pesticides.

Ninety-six of the operatives were classified as truck and tractor drivers. Most drivers (56) worked for farmers and pest control operators. The others were employed in nearly every other industry category; only 9 worked for trucking firms.

TRANSPORTATION OF PESTICIDES BY TRUCK

According to final figures on the 1963 Census of Transportation, 80 percent of pest control chemicals moved beyond local areas in the United States were moved by truck. However, most shipments were local; only a small proportion of the tonnage (23.6 percent) was shipped over 400 miles.[3]

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1 State of California, Department of Employment, *California Annual Farm Labor Report, 1966*. Foreign contract laborers--1966, 1,200; 1965, 2,800.

2 State of California, Department of Industrial Relations, Division of Industrial Safety, *Safety Orders for Agricultural Operations, November 1961*.

3 U.S. Department of Agriculture, *The Pesticide Review, 1967*, p. 3, Washington, D.C.

Chemicals are usually transported in concentrated form so that even moderately toxic materials may be available in lethal quantities. Recent 1967 fatal poisonings of 17 persons in Mexico and of 63 in Colombia, South America, were caused by food contaminated with parathion during transportation or storage. Also in 1967, a spill of about 1,000 pounds of liquid parathion occurred on a highway in California. These three episodes are all examples of the severe health hazards to the general public, as well as to the truck drivers and warehouse workers handling these materials, in the event of mishap.

The Bureau of Occupational Health is working with other governmental agencies concerned with potential hazards arising in transportation and storage of pesticides to develop procedures for the prevention of dangerous accidents as well as for effective decontamination and treatment when accidents occur.

IN THE

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FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 23,812

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Petitioners,

v.

ROBERT H. FINCH,
Secretary, Health, Education and Welfare,

Respondent.

ON PETITION FOR REVIEW OF AN ORDER OF THE SECRETARY OF HEALTH, EDUCATION, AND WELFARE

BRIEF FOR PETITIONERS

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v.

ROBERT H. FINCH,
Secretary, Health, Education and Welfare,
Respondent.

ON PETITION FOR REVIEW OF AN ORDER OF THE SECRETARY OF HEALTH, EDUCATION, AND WELFARE

BRIEF FOR PETITIONERS

QUESTIONS PRESENTED

It is uncontroverted that the pesticide-chemical DDT causes cancer in test animals and is responsible for widespread environmental degradation including damage to nontarget organisms of many species, the preservation of which is essential to the well being of man. In response to evidence to this effect the Secretary of Health, Education, and Welfare not only refused to take immediate action to prohibit the further contamination of raw agricultural commodities with

DDT, he refused to even publish notice of petitioners' proposal in the *Federal Register,* thereby denying them access to the administrative procedures available under the Food, Drug and Cosmetic Act.

The questions presented are:

(1) Whether the Secretary must act immediately to prohibit the continued contamination of raw agricultural commodities by a pesticide-chemical which is established to be cancer-producing; and

(2) Whether, in view of the showing that DDT is a carcinogen and a hazard to human health generally, the Secretary properly could find that petitioners' had not presented "reasonable grounds" in support of their request that existing tolerances for DDT be repealed.

STATEMENT PURSUANT TO RULE 8(d)

Preliminary matters have already been considered and disposed of by the Court in this proceeding. Simultaneous with the filing of its Petition for Review, petitioners filed a "Motion to Advance on the Docket and to Expedite" consideration of this proceeding. On January 14, 1970, Judge McGowan directed that a request for an extension of time filed by respondent be treated as respondent's opposition to petitioners' Motion. On January 29, 1970, a panel of the Court consisting of Chief Judge Bazelon and Judge Robinson granted petitioners' motion, specified an expedited briefing schedule and directed the Clerk to set this proceeding down for early argument.

The same panel of the Court, also on January 29, 1970, directed the parties in No. 23813 *(Environmental Defense Fund, Inc., et al., v. Clifford M. Hardin)* to comply with the same expedited briefing schedule and instructed the Clerk to schedule the matter for early argument. Petitioners there challenge the failure of the Secretary of Agriculture to take actions under the Federal Insecticide, Fungicide and Roden-

ticide Act (61 Stat. 163, as amended, 7 U.S.C. 135, *et seq.*), to suspend and cancel the registrations of economic poisons containing DDT.

REFERENCES TO RULINGS

In this proceeding petitioners seek review of a determination by the Secretary of Health, Education, and Welfare under the Food, Drug and Cosmetic Act, 52 Stat. 1040, as amended, 21 U.S.C. 301, *et seq.* This case comes to the Court as a result of the Secretary's refusal, announced on December 8, 1969, immediately to prohibit residues of the chemical-poison DDT on raw agricultural commodities. The Secretary's decision which is challenged in this Court is set forth at pp. 8-9 of this brief in the Joint Appendix at page A-98.

STATEMENT

A. Nature of this Proceeding

DDT is one of the most popular and widely studied of the of the pesticides.[1] It has been recognized for some time that DDT represents an extreme ecological hazard and, more recently, that it is cancer-producing in test animals. Petitioners, relying on evidence of these hazards, requested the Secretary to act now to protect the public health and well-being by eliminating the unnecessary ingestion of that poison.

The Commissioner of Food and Drugs, acting for the Secretary and without disputing the scientific evidence that DDT is a carcinogen and an environmental hazard generally, denied the petition refusing even to publish notice of petitioners' proposal in the *Federal Register* thereby depriving them of access to the administrative process.

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[1] "DDT", is a mixture of substances which has as its major ingredient the chemical compound 1,1,1-trichloro-2,2-bis-(p-chlorophenyl) ethane. DDT is widely used as a pesticide in a variety of economic poisons.

B. The Statutory and Regulatory Scheme

Petitioners filed their request for administrative action pursuant to Section 408 of the Food, Drug and Cosmetic Act, 21 U.S.C. 346a (hereinafter referred to as "Act"),[2] the pesticide provision. Essentially that provision precludes the use on raw agricultural commodities of pesticide-chemicals which are not generally recognized by "experts qualified by scientific training and experience" as being safe unless they are used within tolerance limits prescribed by the Secretary or pursuant to an exemption order. In establishing tolerances the Secretary is to give appropriate consideration to, among other factors, "the necessity for the production of an adequate, wholesome, and economical food supply [and] to the other ways in which the consumer may be affected by the same pesticide chemical or by other related substances that are poisonous or deleterious." (Section 408(b), 21 U.S.C. 346a(b)). Where "the scientific data before [him] does not justify the establishment of a greater tolerance" the secretary may establish the tolerance at zero. (*ibid.*)

Tolerances have, over the years, been established for DDT residues on scores of raw agricultural commodities ranging from a tolerance level of zero to a high of 7 parts per million. See 21 CFR 120.147-120.147c.[3] However, under the regulations an interested person may request the repeal of existing tolerances and if "reasonable grounds" are presented in support of such a request the petitioner is entitled to have his proposal noticed in the *Federal Register* and otherwise to enjoy the protection of the administrative procedures. 21 CFR 120.32.

The instant case also involves application of the so-called Delaney anticancer amendment which requires the Secretary

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[2]Section 408, as well as the other relevant portions of the Act, are set forth in the Supplement to this brief.

[3]The relevant portions of the regulations are similarly included in the Supplement to this brief.

to prohibit the use of any chemical or additive which is shown to be capable of inducing cancer in test animals. The amendment is contained explicitly in the food additives section of the Act (Section 409(c)(3)(A), 21 U.S.C. 348(c)(3)(A)) and in the color additives section. (Section 706(b)(5)(B), 21 U.S.C. 376(b)(5)(B)).

C. The Petitioners

Petitioner, The Environmental Defense Fund, Incorporated (hereinafter "EDF"), is a nonprofit, tax-exempt membership corporation organized under the laws of the State of New York. EDF is made up of scientists and other citizens dedicated to the protection of man's environment, employing legal action where necessary. EDF has, through litigation, sought to protect the environment from various forms of pollution. Its Scientists Advisory Committee, with more than 200 members, including some of the world's foremost environmental scientists, assures that positions taken are thoroughly supported by scientific evidence. In its activities, EDF does not concern itself with the pecuniary interests of individuals; rather, it seeks to assure the preservation or restoration of environmental quality on behalf of the general public.

Petitioners Irene Lopez, Elvira Garduno, Kathy Radke, Marilyn Vittor and Leigh Roycroft are young mothers who have in the past, do presently, or intend in the future to nurse their children. It is an established fact, recently confirmed by the Commission on Pesticides and Their Relationship to Environmental Health,[4] that mothers' milk contains excessive amounts of DDT residues to the point where breastfed babies as a general rule are subjected to twice the maximum average daily intake of DDT recommended by the United Nation's World Health Organization (App. B-26, 27).[5]

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[4] The so-called Mrak Commission.

[5] "App." references are to the separately bound Joint Appendix.

Petitioner Juan Zamora, the father of eight minor children, is an agricultural worker and as such is required to come into frequent contact with pesticide poisons. Again, the Mrak Commission corroborates that the dangers of DDT are considerably greater for those who must come into repeated contact with it as a consequence of their occupations (App. B-62, 63).

All of the individual petitioners reside in California, each is a consumer of food products, including raw agricultural commodities which contain residues of DDT, and each is economically disadvantaged.[5-A]

D. Prior Proceedings

1. *The Petition*

On October 7, 1969, a petition was filed requesting the issuance of a regulation repealing the tolerances for DDT on raw agricultural commodities. The petition was premised on the fact that DDT has been demonstrated to be cancer-producing in test animals with circumstantial evidence suggestive of possible carcinogenic effects in humans as well. Petitioners submitted, in support of their contentions, a comprehensive study recently completed under the sponsorship of the National Cancer Institute (the so-called *Innes* report)[6] which lays to rest any doubt as to the carcinogenicity of DDT in test animals. Additionally, petitioners submitted an earlier study which shows the carcinogenic potentialities of DDT when ingested by test animals over prolonged periods at dosage levels which approximate those to which the urban population is exposed,[7] and a study which

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[5-A] The Mrak Commission found that the hazards of DDT are compounded in the face of nutritional inadequacies.

[6] *Bioassay of Pesticides and Industrial Chemicals for Tumorigenicity in Mice: A Preliminary Note*, J. R. M. Innes, *et al.*, 41 Journal of the National Cancer Institute 1101 (June, 1969) (App. A-14).

[7] *Investigations on the Effects of Chronically Administered Small Amounts of DDT in Mice*, Kemeny and Tarian, 22 Experientia 748 (1966) (App. A-28).

suggests that DDT may well have carcinogenic effects in man.[8]

On October 31, 1969, petitioners submitted a supplemental filing requesting expedited action by the Secretary directed at prohibiting the continued presence of DDT in raw agricultural commodities. In recognition of the fact that the environment is already contaminated with DDT, thereby posing practical problems with respect to the realization of a zero tolerance, petitioners suggested action which the Secretary reasonably could take at this time so as to rid our food supply of DDT at the earliest date possible—the establishment of zero tolerance levels but exempting from seizure any commodities that contain residues arising from the application of DDT prior to the repeal of existing tolerances.

2. *The Mrak Commission Report*

In December, 1969, the Secretary received the final report of the Mrak Commission. In that report the Commission stated that "the evidence for the carcinogenicity of DDT in experimental animals is impressive and the [Technical Panel on Carcinogenesis] takes no exception to the conclusions as to DDT recorded in the JNCI report of the National Cancer Institute study" (the *Innes* study) (App. B-41).

The Commission reported that DDT residues are established nerve toxins and that they have acute effects on the central nervous system (App. B-21, 22, 25). More specifically, that DDT residues are responsible for the induction of metabolizing enzymes in the liver thus "alter[ing] the susceptibility to drugs or other chemicals that are normally metabolized by these enzymes" (App. B-61) and may, merely as a consequence of their accumulation in fatty tissue, "constitute a health hazard" (App. B-27).

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[8] *Pesticide Concentrations in the Liver, Brain and Adipose Tissue of Terminal Hospital Patients*, J. L. Radomski, W. B. Deichmann, E. E. Clizer, 6 Food Cosmetics and Toxicology 209 (1968) (App. A-30).

Finally, after detailing the adverse effects of DDT residues on phytoplankton, beneficial insects, marine invertebrates, fish, birds and mammals (App. B-15), in some cases destroying entire species (App. B-8, 9, 15-17) the Commission warned (App. B-8):

> Man is an integral part of the living system, which includes about 200,000 species in the United States. Most of these are considered to be essential to the well-being of man. Pesticides are now affecting individuals, populations, and communities of natural organisms. Some, especially the persistent insecticidal chemicals such as DDT, have reduced the reproduction and survival of nontarget species.

3. *The Secretary's Decision*

By letter dated December 8, 1969, Herbert L. Ley, Jr., M.D., Commissioner of Food and Drugs, acting for the Secretary, advised petitioners that their request had been denied (App. A-98):

> This refers to Pesticide Petition No. OEO894, requesting that zero tolerances be established for residues of DDT on raw agricultural commodities.
>
> In a report to the Secretary of Health, Education, and Welfare, dated November 1969, the Commission on Pesticides and Their Relationship to Environmental Health recommends the elimination of all non-essential uses of DDT, i.e., its use be limited to the prevention or control of human disease and other essential uses for which there are no alternatives available. However, the Commission recognized that unavoidable residues of DDT from past uses will continue to be present in the soil, water, air and food supplies for a period of years, and thus that it is not practical to attempt to eliminate the residues of persistent pesticides from food by the establishment of zero tolerance limits. Plans are currently being developed to implement this recommendation of the Commission. We enclose a copy of the White House

announcement of the Environmental Quality Council's review of the report by the Commission on Pesticides. We believe the steps outlined are the most reasonable steps that should be taken at this time.

In the absence of a showing that establishing the zero tolerances you request would be practical, we find that you have not presented reasonable grounds to support the proposed action. Accordingly, a proposal based on the above petition is not being published.

The announcement of the Environmental Quality Council, relied upon by Dr. Ley, does not state that any affirmative action will be taken by the Secretary in response to the DDT menace.

STATUTES AND REGULATIONS INVOLVED

The pertinent parts of the Food, Drug and Cosmetic Act, 52 Stat. 1040, as amended, 21 U.S.C. 301, *et seq*, and of the administrative regulations promulgated in implementation of that Act, 21 CFR Part 120, are set out in the Supplement to this brief.

ARGUMENT

INTRODUCTION AND SUMMARY

In testing the propriety of any action by the Secretary of Health, Education, and Welfare under the Food, Drug and Cosmetic Act, it is appropriate to focus first on the overriding objective sought to be accomplished by the Congress when it passed that legislation: protection of the health and welfare of the consuming public.

As stated by former Secretary Arthur S. Flemming, "there is one thing that a responsible government cannot do. It cannot fail to place at the top of its list of priorities the health of all of the people even though by so doing it may be or may appear to be acting against the economic interests of

a segment of our society. The government's paramount obligation to act in the interest of the health and safety of the people in administration of the food and drug laws was ably set forth by Justice Frankfurter"[9] when he said:

> The Food and Drug Act of 1906 was an exertion by Congress of its power to keep impure and adulterated food and drugs out of the channels of commerce. By the act of 1938, Congress extended the range of its control over illicit and noxious articles and stiffened the penalties for disobedience. *The purposes of this legislation thus touch phases of the lives and health of people which, in the circumstances of modern industrialism, are largely beyond self-protection. Regard for these purposes should infuse construction of the legislation* if it is to be treated as a working instrument and not merely as a collection of English words. [*United States v. Dotterweich*, 320 U.S. 277, 280, emphasis added.][10]

Confronted with a critical health problem which is completely "beyond self-protection" by the individual, the Sec-

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[9]Hearings on H.R. 7624 and S. 2197 before the House Committee on Interstate and Foreign Commerce, 86th Cong., 2d Sess. p. 42, hereinafter referred to as "*Hearings*."

[10]See, also: *62 Cases of Jam* v. *United States*, 340 U.S. 593, 596; *United States* v. *Sullivan*, 332 U.S. 689, 696; *United States* v. *Two Bags, Each Containing 110 Pounds, Poppy Seeds, et al.*, 147 F.2d 123, 127 (C.A. 6, 1945); *C. C. Co.* v. *United States*, 147 F.2d 820 (C.A. 5, 1945); and *United States* v. *30 Cases, Etc.*, 93 F. Supp. 764, 768-769 (S.D. Iowa, 1950).

In *C. C. Co.* v. *United States, supra*, the Fifth Circuit, in upholding condemnation of partially decomposed oysters, recognized (147 F.2d at 824):

> That statutes enacted for the public good and to suppress a public wrong, although they impose penalties or forfeitures, are not to be construed strictly in favor of the defendant but should be fairly and reasonably construed so as to carry out the intention of Congress. The Federal Food, Drug and Cosmetic Act was enacted in the interests of the public welfare to protect the public health, and the courts must give it effect according to its terms.

retary not only took a most restrictive reading of his responsibilities under the Act, he also completely foreclosed utilization of the administrative process.

As we show, where it is established that a pesticide-chemical is cancer-producing, the Secretary has no discretion but to immediately take all steps necessary to protect the public from the continued ingestion of that poison. It is uncontroverted that DDT is a carcinogen. Moreover, it is uncontroverted that DDT, wholly apart from its cancer causing effects, represents an acute hazard to the human liver and central nervous system and is seriously threatening a complete disruption of the entire biosphere through its adverse effects of the survival of many of the species which are considered to be essential to the well-being of man.

In the face of this showing, it was incumbent upon the Secretary to move now to rid our food supply of residues of DDT.

I

SUBSTANTIAL EVIDENCE ESTABLISHES THAT DDT IS A CANCER-PRODUCING SUBSTANCE; ACCORDINGLY, THE SECRETARY MUST ACT IMMEDIATELY TO PROHIBIT RESIDUES OF THAT POISON ON RAW AGRICULTURAL COMMODITIES

A. The Secretary must Prohibit Residues of Cancer-Producing Substances on Raw Agricultural Commodities

1. *The Anticancer Principle and Its Effect*

Congress entrusted responsibility for effectuating the purposes of the Food, Drug and Cosmetic Act to the Secretary of Health, Education, and Welfare; there is one area, however, in which the Secretary is given no discretion: he may not permit residues of cancer-producing substances on foods and in food products.

This principle, the so-called Delaney anticancer principle, was first explicitly included in the Act in 1958 as part of the food additives provision:

> *Provided*, That no additive shall be deemed to be safe if it is found to induce cancer when ingested by man or animal, or if it is found, after tests which are appropriate for the evaluation of the safety of food additives, to induce cancer in man or animal, * * * [Section 409(c)(3)(A), 21 U.S.C. 348(c)(3)(A).][11]

The inclusion of that nondiscretionary language was a direct outgrowth of the world-wide concern that had been focused on the cancer problem in 1956 and 1957. The 1956 symposium of the International Union Against Cancer, which included cancer experts from some fifty countries, had reached the conclusion "that repeated exposure to even a minute dose of a cancer-producing agent constitutes a serious health hazard."[12] This finding was corroborated by scientists at the National Cancer Institute.[13]

Enactment of the Delaney anticancer clause followed as a reaction to the unchallenged scientific conclusion that no one knows how to establish safe tolerances for carcinogens. As stated by Secretary Flemming during his testimony on the color additives amendment of 1960:

> The clause is grounded on the scientific fact of life that no one, at this time, can tell us how to establish for man a safe tolerance for a cancer-producing agent. Until cancer research makes a

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[11] Substantially identical language was included in the color additives Section enacted in 1960 (Section 706(b) (5) (B), 21 U.S.C. 376(b) (5)(B), Supplement pp. 14-15. In 1962 the Delaney proviso of both the food and color additives sections was amended to permit the use of an additive as an ingredient of feed if it will neither adversely affect the animal nor will be found in any edible portion of the animal after slaughter nor in any food from the living animal. P.L. 87-781, 76 Stat. 785.

[12] 106 Cong. Rec. 14350, see also *Hearings*, p. 108.

[13] 106 Cong. Rec. 14350.

> breakthrough at this point, there simply is no scientific basis on which judgment or discretion could be exercised in tolerating a small amount of a known carcinogenic color or food additive. So long as the outstanding experts in the National Cancer Institute and the Food and Drug Administration tell us that they do not know how to establish with any assurance at all a safe dose in man's food for a cancer-producing substance, the principle in the anticancer clause is sound. [106 Cong. Rec. 14350.][14]

The statutory reference point was made a finding of carcinogensis either in humans *or* animals for the obvious reason that protective action should not be withheld until a chemical, although known to be cancer-producing in test animals, is established to have similar potentialities in humans. In fact, the Congress had been advised, in a report submitted to it by the National Cancer Institute, that "[i]f a substance is shown by adequate tests to be carcinogenic for one mammalian species, it is probable that it is carcinogenic for many, but not necessarily for all, other, although quantitative differences between species may be marked."[15]

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[14] This rationale was emphasized repeatedly by Secretary Flemming (*Hearings*, p. 61):

> The preponderance of scientific evidence clearly dictates our position: Our advocacy of the anticancer proviso in the proposed color additives amendment is based on the simple fact that no one knows how to set a safe tolerance for substances in human foods when those substances are known to cause cancer when added to the diet of animals. I should like to underline again one statement in particular which I read earlier from the summary of Dr. Mider's review of the role of certain chemical and physical agents in relation to cancer. It is this:
>
> *No one at this time can tell how much or how little of a carcinogen would be required to produce cancer in any human being, or how long it would take the cancer to develop.*
>
> This is why we have no hesitancy in advocating the inclusion of the anticancer clause.

See also, *Hearings*, pp. 44, 61-62, 74, 87, 94-95, 501 and 507.

[15] *Hearings*, p. 53, from the report on "The Role of Certain Chemicals and Physical Agents in the Causation of Cancers" prepared by

Thus, once it is shown that a chemical or additive is a carcinogen in any strain of test animal no element of discretion remains; the Secretary must prohibit its use where there is a possibility that use would result in the presence of residues in food. This is not only the clear import of the statute and of its legislative history,[16] it has been the consistent construction given by the Secretary and by the only reviewing court that has considered the language.[17]

Secretary Flemming left no doubt as to how he construed the Delaney anticancer clause:

> [The anticancer clause] allows the Department and its scientific people full discretion and judgment in deciding whether a substance has been shown to produce cancer when added to the diet of test animals. But once this decision is made, the limits of judgment have been reached and there is no reliable basis on which discretion could be exercised in determining a safe threshold dose for the established carcinogen.
>
> * * *
>
> And under our basic policy, as well as under the Delaney clause, we have said that where those tests show that a substance will induce cancer when included in the diet of a test animal, that it will be banned. It cannot be used under those conditions. This is our interpretation of the Delaney amendment, and it is our conviction as to sound public policy.
>
> * * *

G. Burroughs Mider, M.D., Associate Director in Charge of Research, National Cancer Institute, National Institutes of Health, Public Health Service, Department of Health, Education and Welfare, quoting from the report of the Subcommittee on Carcinogenesis to the Food Protection Committee, Food and Nutrition Board, National Academy of Sciences - National Research Council.

[16] See 106 Cong. Rec. 14358, and Senate Report No. 2422, 85th Cong., 2d Sess., 1958 U.S. Code Cong. & Adm. News 5300, 5309-5310.

[17] *Bell v. Goddard*, 366 F.2d 177 (C.A. 6, 1966), discussed *infra*, p. 15.

> Now, if these tests show that these substances have induced cancer when ingested by these animals—and, as I said earlier, this question of whether they do or do not show is a matter for scientific determination and the exercise of scientific judgment—but if they show that they have induced cancer when included in the diet of one or both of these animals, then under the law we must ban the use of that particular substance.[18]

It was in full recognition of this contemporaneous administrative construction that the Congress reaffirmed its dedication to the Delaney principle by including it in the color additives amendment of 1960.[19]

Finally, the Sixth Circuit construed the Delaney clause as "generally intended to prohibit the use of any additive which under any conditions induce cancer in any strain of test animal." *Bell* v. *Goddard*, 366 F.2d 177, 181 (1966). In response to the argument that the per capita consumption of the chemical under attack—diethylstilbestrol, an estrogen additive used to produce juicier and fatter caponettes—was insignificant and that we are naturally exposed to estrogens, the Court said (366 F.2d at 182):

> [t]he answer to the petitioner's contentions in great part is that DES is a carcinogen. The record shows that DES is definitely a cause of cancer in animals, at least an inciter of incipient cancer in man, and possibly a cause of cancer in man. The record also shows that it may take many years, as much as the greater part of a lifespan, for a carcinogen to pro-

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[18] *Hearings*, pp. 501, 514 and 517.

[19] Section 706(b) (5) (B), 21 U.S.C. 376(b) (5) (B).

Most recently the Mrak Commission, recognizing that "[t]he effect of the Delaney clause is to require removal from interstate commerce of any food which contains analytically detectable amounts of a food additive shown to be capable of inducing cancer in experimental animals," recommended modification of the language to permit the Secretary some area of discretion (App. B-4).

> duce a detectable cancer, and that the quantity of DES which is required to cause a cancer is presently unknown. All that is positively known is that there is a definite connection between DES and cancer. Furthermore, it was shown that prolonged exposure to even small amounts of carcinogenic substances is more dangerous than short term exposure to the same or even larger quantities.

2. *The Anticancer Principle is Fully Applicable to Pesticide-Chemicals*

As we have shown, the Delaney anticancer principle requires the Secretary to take whatever action is necessary to preclude the addition to food products of additives that are found to induce cancer when ingested by man or animal. We now show that that principle is fully applicable to pesticide-chemicals.

As is true of the Act generally, protection of the public health was an overriding objective sought to be realized by Congress when it enacted the pesticide provision. As stated in both the House and Senate Reports and by the floor leader in the House:

> A primary objective in drafting the bill was to develop legislation that would provide for prompt administrative action to permit effective use of pesticide chemicals without hazard to the public health; legislation that would be safe for consumers and practical for producers.[20]

Hence, in exercising his authority under the provision the Secretary is to consider "the overall effect the pesticide chemical may have in consumers' diets."[21] The Congress emphasized that:

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[20] House Report No. 1385, 83rd Cong., 2d Sess., p. 2; Senate Report No. 1635, 83rd Cong., 2d Sess., 1954 U.S. Code Cong. & Admin. News, p. 2627; 100 Cong. Rec. 9726.

[21] House Report No. 1385, *supra*, fn. 20, p. 3; Senate Report No. 1635, *supra*, fn. 20, p. 2628. See also House Report No. 1385, p. 8 and Senate Report No. 1635, p. 2632.

> Before any pesticide-chemical residue may remain in or on a raw agricultural commodity, scientific data must be presented to show that the pesticide-chemical residue is safe from the standpoint of the food consumer. The burden is on the person proposing the tolerance or exemption to establish the safety of such pesticide-chemical residue.[22]

Finally, the Congress made it clear that the tolerances were to be established by focusing on the particular pesticide-chemical "rather than with reference to the formulated or finished product itself. For example, in a finished product containing DDT a tolerance under this bill would be established for DDT rather than for the finished product itself."[23]

a. The Secretary, by contemporaneous administrative construction, has construed the Delaney principle as being fully applicable to the pesticide provision

It has long been recognized that "[a]dministrative practice, consistent and generally unchallenged, will not be overturned except for very cogent reasons [and that this] practice has peculiar weight when it involves a contemporaneous construction of a statute by the men charged with the responsibility of setting its machinery in motion * * *". *Norwegian Nitrogen Co.* v. *United States*, 288 U.S. 294, 315. As we show, the person "charged with the responsibility of setting" in motion the machinery of the Food, Drug and Cosmetic Act not only construed the Delaney principle as applying fully to the pesticide provision, he so told the Congress. Indeed, the Congress was advised that even if an anticancer policy had not been stated, the Secretary would nevertheless read the Act as if it were included. The Congress, apprised of this contemporaneous administrative construction, tacitly endorsed it.

[22]House Report No. 1385, *supra*, fn. 20, p. 5; Senate Report No. 1635, *supra*, fn. 20, p. 2629.

[23]House Report No. 1385, *supra*, fn. 20, p. 7; Senate Report No. 1635, *supra*, fn. 20, p. 2631.

The anticancer principle was first inserted in the Food Additives amendment enacted on September 6, 1958. By November 9, 1959, the Secretary already had construed its requirements as applying to pesticide-chemicals and, indeed, had relied upon it in ordering the destruction of raw agricultural commodities that contained residues of a pesticide-chemical which had been found to be capable of inducing cancer in test animals. The pesticide-chemical was aminotriazole, the raw agricultural commodities were cranberries. In stopping the sale of cranberries that were found to have residues of aminotriazole "which causes cancer in the thyroid of rats when it is contained in their diet," Secretary Flemming stated:

> Because of the implications of this incident in its relation to the safety of our food supply, I am prompted to make the following additional comment.
>
> As the cranberry episode illustrates, the Food and Drug Administration has declined to set any tolerance for any amount of a chemical in foods if the chemical produces cancer when fed to test animals. This principle is set down in the Food Additives Amendment, enacted last year, in a specific provision prohibiting the Food and Drug Administration from setting any tolerance for any such chemical. Even though the earlier Pesticide Amendment, which is applicable to the cranberries, does not contain such a specific prohibition, the same principle has been applied.
>
> The application of this principle is necessary in our opinion because while in theory there may be a minute quantity of a carcinogen which is safe in foods, in actuality our scientists do not know whether this is true or how to establish a safe tolerance.
>
> Therefore, we would oppose any attempt to take the cancer clause out of the Food Additives Amendment, and we will support the inclusion of such a

clause in the color bill which is now before the Congress.[24]

Five days later, in issuing his third directive that contaminated cranberries be seized, Secretary Flemming said:

> Seizure action is being initiated on the basis that the berries were shipped illegally in interstate commerce since no tolerance for aminotriazole in foods has been established. Refusal by the Food and Drug Administration to set a tolerance for this chemical is in accordance with the Department's policy not to permit the use of chemicals in food when it is established that they cause cancer in animals or in man, a policy incorporated by Congress in the Food Additive Amendment to the Food, Drug and Cosmetic Act.[25]

On November 16, 1959, the Secretary expanded on the rationale underlying his actions:

> Refusal on the part of the Food and Drug Administration to permit the inclusion of any quantities of aminotriazole in food is based on the Department's policy of refusing to permit the use of chemicals in food when it is established that they cause cancer in animals or man. Research has established the fact that the weed killer, aminotriazole, causes cancer in the thyroid of rats when it is contained in their diet. The basic laws under which the Food and Drug Administration operate provide authority for the institution of such a policy.
>
> This policy, however, was actually looked at and considered by the Congress when in 1958 it included specific language in the Food Additive Amendment to the Food, Drug and Cosmetic Act.
>
> The provision states that "no additive shall be deemed safe if it is found to induce cancer when ingested by man or animal, or if it is found, after tests

[24] HEW, News Release, November 9, 1959.

[25] HEW, News Release, November 14, 1959.

which are appropriate for the evaluation of the safety of food additives, to induce cancer in man or animal."

In such circumstances, the Food and Drug Administration is prohibited from issuing regulations setting tolerances for the additive, and shipment of foods containing any amount of such additive in interstate commerce is therefore illegal.[26]

And on November 18, 1959, the Secretary not only reaffirmed that it was Departmental policy to apply the requirements of the Delaney anticancer principle to pesticide-chemicals, he also noted that he had so advised the Congress:

I have called this conference for the purpose of considering a plan to be submitted by representatives of the cranberry industry designed to separate contaminated cranberries from those that are not contaminated.

The shipment in interstate commerce of cranberries containing residues of aminotriazole is in violation of the Food, Drug, and Cosmetic Act.

Refusal on the part of the Food and Drug Administration to permit the inclusion of any quantities of aminotriazole in food is based on the Department's policy of prohibiting as unsafe the use of chemicals in food when it is established that they cause cancer in animals or man. Research has established the fact that the weed killer, aminotriazole, causes cancer in the thyroid of rats when it is contained in their diet.

It is the Department's position that because such a chemical is unsafe, we cannot issue a regulation setting a tolerance for it when it causes cancer in man or animal. Shipment of foods containing any amount of such a chemical in interstate commerce is therefore illegal.

This policy is basic in our food and drug law, and it was spelled out in the law itself when Congress re-

[26] HEW, News Release, November 16, 1959.

cently passed the Food Additives Amendment. This included the following provision:

[Delaney Amendment set out]

In endorsing this language, we told Congress this policy was already in force under the pesticide chemicals law without the above-quoted language.[27]

This statutory construction was discussed in detail by the Secretary when he testified on the 1960 color additives amendment,[28] with the following colloquy taking place:

The CHAIRMAN. Mr. Younger.

Mr. YOUNGER. Yes, Mr. Chairman. Mr. Secretary, as regards the question of applying the test to any of the substances used in insecticides, or additives, have all of them been tested as to cancer?

Secretary FLEMMING. Mr. Congressman, and Mr. Chairman, taking the pesticides side of the amendment first, if I may do so—

Mr. YOUNGER. Yes.

Secretary FLEMMING. About 110 pesticides have been cleared, authorized, or certified as safe by the Food and Drug Administration. That means, of course, that that authorization includes the question of whether or not they are carcinogenic, or whether or not they do induce cancer.[29]

Furthermore, in a subsequent letter to Chairman Oren Harris of the House Committee on Interstate and Foreign Commerce, the Secretary again emphasized that

According to advice of our scientists, the principle of the above-quoted anticancer (Delaney) proviso of the Food Additives Amendment reflects, basically, the current state of scientific knowledge, and we would therefore, except as noted below, feel con-

[27] Statement of Arthur S. Flemming, November 18, 1959.

[28] *Hearings*, pp. 63-69, 89-90.

[29] *Hearings*, p. 75.

> strained to apply the same principle even in the absence of this proviso, and we do in fact apply it in the administration of the Pesticide Chemicals Amendment which does not contain the proviso.[30]

It is also of significance that in the regulations promulgated in implementation of the pesticide provision, only four specific reasons are detailed as examples of when it may be appropriate to establish a zero tolerance for the residues of a chemical. Among the reasons singled out for such emphasis is where (21 CFR 120.5):

> (b) The chemical is carcinogenic to or has other alarming physiological effects upon one or more of the species of the test animals used, when fed in the diet of such animals.

Moreover, the Secretary has emphasized that he would feel compelled to apply the anticancer principle even if it had not been expressly included in the Act. Senator Dirksen summarized the Secretary's position as follows (106 Cong. Rec. 15381):

> Mr. President, this matter has been of considerable interest to me. I have discussed it with the Secretary of Health, Education, and Welfare. He says that even if the Delaney amendment were deleted from the legislation, they would still have to apply that general principle, and that they do apply it on the advice of the National Institutes of Health.[31]

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[30] House Report No. 1761, 86th Cong., 2d Sess., 1960 U.S. Code Cong. & Adm. News, p. 2936.

It is interesting to note that the Department of Agriculture concurred in the conclusion that the requirements of the Delaney anticancer principle should be read into the pesticide provision. See *Hearings*, pp. 379 and 384-385.

[31] Similar characterizations of the Secretary's position were offered in the House by Chairman Harris (106 Cong. Rec. 14359 and 14362):

> The Secretary further stated that even if the Delaney clause is deleted from the bill, he believes that he has the authority to apply the policy that is reflected in that clause but he urged the Congress to join with the executive branch

The Secretary reached this conclusion in view of the overriding consumer protection objective of the Act and the inability to fix safe levels of carcinogens:

> As long as the preponderance of scientific evidence is in that particular direction, then I say that the policy incorporated in the Delaney amendment is a sound policy and one that we should follow.
>
> Whenever we establish the fact that a substance induces cancer when included in the diet of an animal, we are going to bar its use as far as it being included in the diet of man is concerned; that is, we are going to do everything we can under our existing law to achieve that objective.[32]
>
> * * *
>
> I want to emphasize the statement I made on January 26 that the Food, Drug and Cosmetic Act, as it now stands, will be enforced to prohibit the addition of cancer-producing substances to food unless a law should be passed directing us to follow another course of action.

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in giving added assurance to the public by including the anti-cancer clause in the proposed color additives legislation.

* * *

It is true that the Secretary of Health, Education, and Welfare did say if we did not have the Delaney clause in the bill - and I here want to join others in complimenting the gentlemen from New York [Mr. Delaney] for his consistent and determined effort toward this great problem - he would administer the law the same as if the Delaney clause had been written into it. The Secretary did have this provision in the bill when he sent it up to the Congress and asked me to introduce it. The Secretary testified he thought it should remain in the bill because he did not believe that he as Secretary or any administrator at this time should have the authority to make a determination permitting the use of any substance known to be cancer producing.

See also 106 Cong. Rec. 14358 and House Report 1761, 86th Cong., 2d Sess., 1960 U.S. Code Cong. & Adm. News, pp. 2932-2933.

[32] *Hearings*, pp. 95-96.

> Even though we have this authority in the law, we urge the Congress to join with the executive branch to give added assurance to the consuming public by directing the anticancer clause in the proposed color-additives amendment.[33]
>
> * * *
>
> As I indicated in my testimony, with or without a Delaney amendment on the food additives, with or without a Delaney amendment on the color additives, this is the policy that we would follow under the basic authority that has been conferred on us by Congress.
>
> We know of no other way of discharging that authority in a manner that would be fair to the consumer.[34]
>
> * * *

b. Congress intended for the Delaney principle to apply to the Food, Drug and Cosmetic Act generally, including the pesticide provision

As we have shown, Congress was well apprised of the fact that the Secretary was applying the Delaney anticancer principle to the pesticide provision and tacitly approved of that construction of the Act when it passed the color additives amendment. We now show that Congress itself considered the explicit statement of the Delaney principle unnecessary, rejected efforts to weaken the Act's built-in anticancer bias, and intended for the pesticide and food and color additives sections to be similarly construed.

Perhaps the most striking aspect of the legislative history of the first Delaney amendment is that the Committees of both the House and the Senate with responsibility for the Act, thought the amendment unnecessary; that is, considered it implicit in the general language of the Act. Congressman Oren Harris, Chairman of the Committee on Interstate and

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[33] *Hearings*, p. 501.

[34] *Hearings*, p. 506. See also, *Hearings*, pp. 61-63, 74, 508, 513, 524-526.

Foreign Commerce, explained the Committee's action as follows (104 Cong. Rec. 17414, emphasis added):

> Subsequently to the reporting of the bill, as amended in the full committee, the committee adopted unanimously a further amendment to the amendment. This amendment was suggested by Mr. DELANEY who over the years since he was the chairman of a Select Committee to Investigate the Use of Chemicals in Food and Cosmetics, has expressed his deep and abiding interest in this subject. *While the Committee felt that the bill as reported by the committee includes the matter covered by the Delaney amendment in the general language contained in the bill, there was no objection to the addition of the amendment suggested by Mr. DELANEY.* This amendment would be inserted on page 24, line 16 of the bill H.R. 13254, as reported; * * *

The report of the Senate Committee on Labor and Public Welfare is even more emphatic on this point (emphasis added):

> Two amendments made by your committee to the bill as passed by the House are explained below. We would like, in addition, to call attention to the fact that the Committee on Interstate and Foreign Commerce of the House of Representatives, before bringing the bill to a vote in the House, decided to add to its previously approved bill the provision which appears on page 8 of the House-passed bill (lines 10 to 15) and reads as follows:
>
> [Delaney anticancer clause set out]
>
> Your committee, which has the responsibility in the Senate of considering all legislation primarily relating to the health of our people, is well aware and thoroughly approving of the vast amount of time and energy which Congressman Delaney, author of that amendment, has devoted to the fight against cancer and to our attempts to find its cause and cure. *We have no objections to that amendment whatsoever, but we would point out that in our opinion it is the intent and purpose of this bill, even without that*

> *amendment, to assure our people that nothing shall be added to the foods they eat which can reasonably be expected to produce any type of illness in humans or animals.* We applaud Congressman Delaney for having taken this, as he has every other opportunity, to focus our attention on the cancer-producing potentialities of various substances, but we want the record to show that in our opinion the bill is aimed at preventing the addition to the foods our people eat of any substances the ingestion of which reasonable people would expect to produce not just cancer but any disease or disability. *In short, we believe the bill reads and means the same with or without the inclusion of the clause referred to. This is also the view of the Food and Drug Administrator.*[35]

Thereafter in 1960 Congress turned aside efforts to temper the impact of the anticancer principle; specifically, to make carcinogenicity just another factor to be considered by the Secretary. Chairman Harris explained why the House Committee rejected these efforts (106 Cong. Rec. 14359):

> The [National Academy of Sciences] panel discussed in considerable detail the scientific problems that confront us in connection with determination of the cancer-producing potentials of chemicals. They pointed out the difficulties of designing and conducting an experiment to determine whether a substance is a cancer producer for man and the difficulties in evaluating the test data after they are obtained.
>
> Some of the panel members have suggested that despite these difficulties, in extraordinary cases, the Secretary of Health, Education, and Welfare should have the authority to decide that a minute amount of a cancer-producing chemical may be added to man's food after a group of scientists consider all the facts and conclude that the quantity to be tolerated is probably without hazard.
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> * * *

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[35] Senate Report No. 2422, 85th Cong., 2d Sess., 1958 U.S. Code Cong. & Adm. News, pp. 5309-5310.

> In view of the uncertainty surrounding the determination of safe tolerances for carcinogens, the committee decided that the Delaney anticancer provision in the reported bill should be retained without change.

Finally, even had Congress not emphasized the pervasive nature of the anticancer prohibition, it intended for the pesticide, and food and color additives provisions to be similarly construed. Each of those provisions have the same fundamental purpose: safeguarding the public health by protecting the consumer.[36] Further, each was an outgrowth of the investigation and findings of the Select Committee to Investigate the Use of Chemicals in Food Products.[37] It was the apparent intent of the Select Committee to initiate substantially parallel legislation covering each of those areas.[38] The absence of the anticancer clause in the pesticide provision is explained by the fact that it had been enacted two years before disclosure of the cancer findings which prompted the Delaney amendment. (See *supra*, p. 12). And there was no reason for Congress to amend the pesticide provision: first, Congress did not consider the anticancer clause necessary (see *supra*, pp. 25-26) and second, it was fully apprised of the Secretary's determination—as a matter of law—to apply the anticancer principle no less rigorously to pesticide-chemicals (see *supra*, p. 17).[39]

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[36] *Pesticides:* House Report No. 1385, *supra*, fn. 20, pp. 2, 3, 5 and 7; Senate Report No. 1635, *supra*, fn. 20, pp. 2627-2629 and 2632; 100 Cong. Rec. 9726. *Food Additives:* House Report No. 2284, 85th Cong., 2d Sess., pp. 1, 4 and 5; Senate Report No. 2422, *supra*, fn. 16, p. 5301; 104 Cong. Rec. at 17413, 17416, 17418-17420. *Color Additives:* 106 Cong. Rec. at 14350 and 14358.

[37] *Pesticides:* House Report No. 1385, *supra*, fn. 20, p. 4; Senate Report No. 1635, *supra*, fn. 20, p. 2628; *Food Additives:* House Report No. 2284, *supra*, fn. 36, p. 2; *Color Additives:* 106 Cong. Rec. 14358; *Hearings*, p. 107.

[38] House Report No. 2356, 82nd Cong., 2d Sess., pp. 26 and 27. See, also, *United States* v. *Bodine Produce Co.*, 206 F. Supp. 201, 206-207 (Ariz., 1962).

[39] It is not without interest that industry groups did not object either to the explicit inclusion of the anticancer clause in the color

In *Flemming* v. *Florida Citrus Exchange*, 358 U.S. 153, a unanimous court upheld the Secretary's decision to decertify a coal-tar color, which had been certified for almost fifteen years, because evidence before him indicated that the color, when included in the diets of rats in small dosages "was deleterious and often fatal, with liver damage and enlargement of the heart in evidence." 358 U.S. at 159. It is significant that the color additives provision had not yet been amended to include, explicitly, the anticancer principle. Yet the court agreed that it was appropriate for the Secretary to base his potential harm to humans finding on the results obtained from the testing of laboratory animals. See, also: *Certified Color Industry Committee, et al.* v. *Secretary*, 283 F.2d 622 (CA 2, 1960), where the court extended *Florida Citrus* to permit the Secretary to apply his revocation order to color batches previously certified.[40]

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additives provision or its implicit reading by the Secretary into the pesticide provision. *Hearings*, pp. 172, 182 and 183.

[40] That each of these provisions is to be similarly construed is also evident from the comments of Assistant Secretary of Commerce Elliot L. Richardson, on the inclusion of the first proposed anticancer clause (104 Cong. Rec. 17415):

> The widespread interest in cancer led to suggestion that the food additives legislation should mention the disease by name and forbid the approval of any substance that is found upon test to cause cancer in test animals. This Department is in complete accord with the intent of these suggestions - that no substance should be sanctioned for uses in food that might produce cancer in man. H.R. 13254, as approved by your committee, will accomplish this intent, since it specifically instructs the Secretary not to issue a regulation permitting use of an additive in food if a fair evaluation of the data before the Secretary fails to establish that the proposed use of the additive will be safe. The scientific tests that are adequate to establish the safety of an additive will give information about the tendency of an additive to produce cancer when it is present in food. Any indication that the additive may thus be carcinogenic would, under the terms of the bill, restrain the Secretary from approving the proposed use of the additive unless and until further testing shows to the point of reasonable certainty that the additive would not produce cancer and thus would be safe under the proposed conditions

B. The Record Establishes that DDT is a Carcinogen

As we have shown the Delaney anticancer principle pervades the entire Food, Drug and Cosmetic Act and applies with full force to its pesticide provision. That being the case it is incumbent upon the Secretary to establish, without delay, zero tolerances for the residues of any pesticide-chemical which is found capable of inducing cancer in man or in "any strain of test animal." *Bell* v. *Goddard, supra* at p. 181.

We now show that in light of the overwhelming and uncontroverted evidence of record which establishes the carcinogencity of DDT, it is incumbent upon the Secretary to take immediate action directed at securing the complete absence of DDT residues on raw agricultural commodities.

1. *The Evidence Presented to the Secretary by Petitioners Establishes that DDT is a Carcinogen*

In support of their contention that DDT is a carcinogen petitioners submitted three scientific studies. The most comprehensive was that recently completed by thirteen scientists working under the sponsorship of the National Cancer Institute, National Institutes of Health, Department of Health, Education, and Welfard—the so-called *Innes* report (App. A-14).[41] DDT was added to the diet of mice and compared with both positive and negative control groups (App. A-15). The frequency of tumors of the liver, lungs and lymphoid organs was four times greater in mice fed DDT than those in the negative control group (App. A-24). The carcinogenicity was clearly established because DDT caused cancer of the same kind and at approximately the same frequency as did

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of use. This would afford good, strong public health protection.

[41] *Bioassay of Pesticides and Industrial Chemicals for Tumorigenicity in Mice: A Preliminary Note*, J. R. M. Innes, *et al.*, 42 Journal of the National Cancer Institute 1101 (June, 1969).

known cancer-causing agents, the positive controls (App. A-24, 26).

The National Cancer Institute study confirmed earlier evidence indicating the carcinogencity of DDT. One study also submitted in support of the petition, a five generation study of mice, is particularly probative for it found carcinogenicity to result from prolonged exposure to low levels of DDT.[42] The mice were fed a dosage of DDT at a level which resulted in its accumulation in the fatty tissue of the experimental group in "the same order as the DDT level in the fatty tissue of the urban population" (App. A-29). It was found that the mice which had been subjected to the accumulation of low levels of DDT developed a substantially higher incidence of leukemia and of tumors than did the non-DDT mice (App. A-29).

Finally, petitioners submitted a study which is at least probative evidence that DDT may have carcinogenic effects in man.[43] In studies undertaken at the University of Miami School of Medicine, human victims of terminal cancer were found to contain more than twice the concentration of DDT residues in their fat as did victims of accidental death (App. A-34, 35). The accident victims were found to carry 9.7 parts per million in their fat, about average for Americans, while the cancer victims contained 20 to 25 parts per million (App. A-34-36).

2. *The Report of the Mrak Commission Corroborates Conclusively the Finding that DDT is a Carcinogen*

In rejecting the petition the Secretary acknowledged that he had relied in part on the findings of the Mrak Commission.

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[42] *Investigations on the Effects of Chronically Administered Small Amounts of DDT in Mice*, Kemeny and Tarian, 22 Experientia 748 (1966) (App. A-28).

[43] *Pesticide Concentrations in the Liver, Brain and Adipose Tissue of Terminal Hospital Patients*, J. L. Radomski, W. B. Deichmann, E. E. Clizer, 6 Food Cosmetics and Toxicology 209 (1948) (App. A-30).

However the findings of that Commission, rather than in any way detracting from the effect of the scientific evidence submitted by petitioners, supports fully the conclusion that DDT is a carcinogen.[44]

At the outset it should be noted that the Commission acknowledged the credibility of the *Innes* study (App. B-41), agreeing both with the propriety of using test "doses considerably higher than would be present in food" (App. B-37) and with the conclusion of the *Innes* group that evidence of increased tumorigenicity must be accepted as an index of potential carcinogenicity (App. B-36) since "(a) No adequately tested chemical has been found to produce only benign neoplasms and, (b) a substantial percentage of benign-appearing tumors in mice has been demonstrated ultimately to eventuate in cancer" (App. B-47).

The panel itself caterogized pesticide-chemicals according to their probable carcinogenesis (App. B-38). Of critical significance is the fact that DDT was included among the "compounds judged 'positive' for tumor induction on the basis of tests conducted adequately in one or more species, the results being significant at the 0.01 level" (App. B-40). Indeed, the panel acknowledged that "the observations of human experience have not been sufficient to eliminate the possibility that continued chronic exposure [to DDT] may slowly induce a low level of cancer in man" (App. B-41).

The Commission's Technical Panel on Carcinogenesis was particularly concerned about reducing residues in food because it found that (App. B34):

> The presence of carcinogenic substances (of both synthetic and natural origin) in food might be a significant factor in the occurrence of what is

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[44] Indeed, the Commission stated that "the evidence for the carcinogenicity of DDT in experimental animals is impressive and the Panel takes no exception to the conclusions as to DDT recorded in the JNCI report of the National Cancer Institute study." (App. B-41).

commonly referred to as "spontaneous" cancer in man and animals. * * *[45]

C. The Secretary Has Utterly Failed to Comply With the Act

It remains only to apply the principle of the Delaney clause to the evidence of the carcinogenicity of DDT. We submit that there is no way in which the anticancer principle can be applied, short of its complete obliteration, without reaching the conclusion that the Secretary is under a statutory mandate to take whatever action is necessary to achieve the elimination of DDT residues from raw agricultural commodities.

But what has the Secretary done; he has responded with grandiose assurances that he will, sometime in the future, consult with the Secretaries of Agriculture and Interior "on the environmental contamination aspects of pesticide registrations" and he has "agreed that HEW should review established tolerance levels of specific pesticides in food and drinking water." This is the sum and substance of the Secretary's response; assurances of concern coupled with the postponement of action. These, declared the Secretary in his rejection of petitioners' request for immediate action, "are the most reasonable steps that [he] should be tak[ing] at this time" (App. A-98).

What the Secretary ignores, however, is that the Delaney anticancer principle permits no equivocation; it does not ask for assurances and promises but rather for action and immediate action at that. This is where the Secretary has completely failed to discharge his responsibility. Stripped of rheteric he has done nothing to protect the public from the continued ingestion of the carcinogen DDT. To be sure it is the Secretary of Agriculture that has the authority to suspend and cancel the registration of pesticides. But the Secretary of Health, Education, and Welfare cannot hide

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[45] Earlier in the Report it is stated that since human exposure to pesticides is greatest through foods; "so far as the health of the general population is concerned, the greatest emphasis on pesticide control should be on reducing the concentrations in food" (App. B-7).

behind that dichotomy of authority; he has his own responsibilities and they require taking all actions necessary to effect the immediate cessation of the use of DDT.

The Secretary's preoccupation with possible adverse economic effects on industry is misplaced. The clear import of the Delaney amendment is that when the conflict is between possible economic disruption and the ingestion of a carcinogen, protection of the public health, and not the enhancement of private gain, is always to win out. Certainly this is made clear in *Flemming v. Florida Citrus Exchange*, 358 U.S. 153, where the Supreme Court rejected the contention that the Secretary was to establish a tolerance for a color (which was found not to be harmless) because its use was an economic necessity. It is noteworthy that unlike DDT the additive there at issue is not a carcinogen.

It is particularly imperative that the Secretary move with all possible expedition in the case of DDT. First, the studies of *Radomski, et al.* submitted by petitioners (App. A-30) are at least circumstantial evidence that DDT may be carcinogenic not only in test animals but in man as well; the Mrak Commission itself raised a serious question along these lines (App. B-41). Second, the chemical stability of DDT, with a probable "half-life" of 10 to 15 years, makes it imperative that its usage be prohibited immediately. Lastly, each member of the public, once having been warned of the potential dangers of most food additives can voluntarily stop their further ingestion. In the case of DDT no element of choice exists. Like it or not each of us is forced to ingest DDT regularly included as an additive to the food we eat.

Even if it were permissible for the Secretary to defer immediate action directed at the withdrawal of a pesticide carcinogen the continued use of which is necessary for public health and food production purposes, deferral of action in the case of DDT could not be justified. The Mrak Commission found that (App. B-5):

> It is reported by well informed scientists that as far as insect vectors of disease are concerned there are none known which are normally susceptible to DDT that cannot be controlled with a substitute.

* * *

> * * * Although DDT is still involved in some of the international food production programs sponsored by U.S. agencies, there is a feeling that a withdrawal or systematic reduction of DDT would have a minimum effect.[46]

II

PETITIONERS PRESENTED "REASONABLE GROUNDS" IN SUPPORT OF THEIR PETITION; ACCORDINGLY, IT WAS INCUMBENT UPON THE SECRETARY TO AT LEAST PUBLISH THEIR PROPOSAL IN THE *FEDERAL REGISTER* THEREBY INITIATING THE ADMINISTRATIVE PROCEDURES

In response to the petition, W. B. Rankin, Deputy Commissioner, Food and Drug Administration, advised petitioners that it was "being processed as provided by 21 CFR 120.32" (App. A-86). That regulation provides that "an interested person furnishing reasonable grounds therefor, may propose * * * repealing a tolerance for a pesticide chemical on raw agricultural commodities * * *." It defines "reasonable grounds" as including "an explanation showing wherein the person has a substantial interest in such tolerance * * * and an assertion of facts (supported by data if available) showing * * * that new data are available as to toxicity of the chemical * * *." Subsequently, Herbert L. Ley, Jr., M.D., Commissioner of Food and Drugs, by letter of December 8, 1969, advised petitioners of the Department's determination that "a proposal based on [their] petition is not being published" (App. A-98). After referring to the persistence of DDT, Commissioner Ley found that "in the absence of a showing that establishing the zero tolerances you request would be practical, we find that you have not presented reasonable grounds to support the proposed action" (App. A-98).

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[46] See also App. B-6, 25. This is because of the fact that there are many alternatives to DDT (App. B-5, 7), alternatives "that do not have the damaging side effects on the environment that DDT exhibits" (App. B-6).

The effect of this determination was to deprive petitioners not only to the benefits of *Federal Register* publication, but to deny to them the entire administrative machinery provided for in the Food, Drug and Cosmetic Act. While it is conceded that the fact that there is widespread environmental contamination complicates the problem for the Secretary, it is ludicrous to thereby suggest that the Secretary need do little more than bemoan the magnitude of the problem. Instead, what is called for is full utilization of the administrative processes for the collection and distillation of all possible solutions.

The procedures provided for in 21 CFR 120.32 have a dual purpose. First, to assist the Secretary in the discharge of his statutory responsibilities by invoking a dialogue as to the dangers of a particular pesticide and second, to assist the Secretary by focusing on the solutions which are available to him to meet a recognized danger. In the case of DDT the dangers are uncontroverted; it is the solution which is at issue. The Secretary, by his own concession, does not himself know how to solve the DDT problem. The purpose of 21 CFR 120.32 is to permit the public generally to lend its assistance with the hope of broadening the Secretary's awareness as to what can be done.

Petitioners recognized the difficulty of the problem which confronts the Secretary (a problem which under the Delaney principle he cannot lawfully ignore) and in their supplemental filing of October 31, 1969 suggested a possible solution which would give effect to the anticancer mandate while not threatening confiscation of a major portion of our food supply—the immediate establishment of zero tolerances with exemption from seizure of any commodities that contain DDT residues that are a consequence of applications made prior to the effective date of the revised tolerances.

We do not suggest that this is the only procedure for effecting the required zero tolerance. We do contend that it is not a frivolous suggestion and that it should have suggested to the Secretary that had the proposal been

published in the *Federal Register* other solutions would have been forthcoming.[47] The real objective of public notice is, after all, to marshall information for the benefit of administrative agencies that may unfortunately be less than omniscient but nevertheless have to make judgments which can have a profound effect on our well-being. It is clear therefore, that petitioners[48] and the public generally were substantially prejudiced by the Secretary's refusal to notice the proposal.

There was no basis upon which the Secretary properly could conclude that petitioners had not presented "reasonable grounds" sufficient, at least, to initiate the administrative process.[49]

We have already shown that DDT is a carcinogen. We now show that wholly apart from its carcinogenic potentials DDT represents an imminent hazard to human health, if indeed, not to survival itself.[50]

> Man is an integral part of the living system which includes about 200,000 species in the United States. *Most of these are considered to be essential to the well-being of man.* Pesticides are now affecting individuals, populations, and communities of natural organisms. Some, especially the persistent insecticidal chemicals such as DDT, have reduced the reproduction and survival of nontarget species. (App. B-8, emphasis added).

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[47] The Mrak Commission itself offered an alternative proposal, the "stepwise lowering" of tolerances (App. B-4).

[48] It should be noted that no suggestion was made in Dr. Ley's letter that the petitioners were not "interested persons" or that they otherwise lacked standing to prosecute their petition.

[49] The Secretary's denial seems premised on a failure to establish reasonable grounds in support of the particular solution offered by petitioners; the regulation does not permit so restrictive a reading.

[50] A showing of carcinogenicity is, of course, not necessary to initiate a repeal proceeding.

That conclusion of the Mrak Commission is corroborated in frightening detail throughout its voluminous report. DDT residues are established nerve toxins and have acute effects on the central nervous system (App. B-21, 22, 25).[51] In addition, DDT residues are responsible for the induction of metabolizing enzymes in the liver, including in the liver of man (App. B-20, 24, 29),[52] thus "alter[ing] the susceptibility to drugs or other ehcmicals that are normally metabolized by these enzymes" (App. B-61), and generally causing liver damage (App. B-21, 22, 26, 28). And DDT concentrations in fat (it is accumulated in fatty tissue) may itself "constitute a health hazard". (App. B-27).[53]

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[51] The Commission specifically found that:

> The chlorinated hydrocarbon insecticides, especially DDT, have been known to act in the cerebellum, brainstem, spinal cord, and peripheral nerves * * * Thus the acute effects of these compounds appear to be scattered widely throughout the nervous system. Moreover, they have topical action on the nerve endings in the mucous membrane (Hayes, 1963) and may extend their action proximally on the nerve pathways as shown by various case reports, * * * (App. B-28).
>
> * * * *
>
> In animals, the earliest apparent effect of DDT poisoning is abnormal susceptibility to fear, with violent reaction to stimuli that normally would be unnoticed (Hayes, 1965). There is definite motor unrest and an increased frequency of spontaneous movements. A fine tremor appears and becomes constant, interfering with normal activity. As the nervous system involvement progresses, there are attacks of epileptiform tonoclonic convulsions. Death may result from ventricular fibrillation. (App. B-29)

[52] As stated by the Mrak Commission, "it is a sad comment on the dearth of knowledge of human physiology to point out that the threshold dose of DDT for induction of metabolizing enzymes in human liver is unknown." (App. B-20).

[53] The Mrak Commission goes on to acknowledge that "rapid mobilization of fat in nutritional deprivation may result in sufficiently high residual DDT levels to produce conventional toxicity * * * Such toxicity has actually been demonstrated for DDT in rats in laboratory experiments" (App. B-27).

Apart from these direct human health hazards from the exposure to DDT residues, such residues have a profound effect on the biosphere upon which man is dependent. For example, DDT and its residues interfere with the photosynthetic process (App. B-6, 15). The relationships between DDT residues and hazards to bird populations, by both direct mortality and reproductive failure, have been particularly well documented. (App. B-16). DDT causes carniverous birds, including birds of prey,[54] sea birds, and many other species, to lay eggs with abnormally thin shells. These eggs break prematurely resulting in sharply reduced reproductive success. Populations of these species have in many cases undergone catastrophic declines, in some cases approaching extinction. The decline in eggshell thickness occurred in the late 1940's, shortly after the large scale introduction of DDT into the world environment. Controlled feeding experiments with DDT and its metabolites have established the casual relationship between DDT residues, the production of eggs with abnormally thin shells, and greatly reduced reproductive success (App. B-17).

DDT inhibits reproduction in fish, with abnormal mortality of the fry following the contamination of the adult fish and their eggs. This has occured in several freshwater situations, with mortalities of 100 percent of the fry in some instances (App. B-16). Controlled experiments confirmed that DDT residues were the causative agents (*ibid.*). Many fish from other areas, including commercially important fish from marine waters, show concentrations of DDT residues in their tissues that approach those that caused this abnormal fry mortality. Important freshwater and marine fisheries are

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[54] This is a consequence of biological magnification which results in the concentration of DDT residues as you move up a food chain. ("Chemicals which are preferentially absorbed into living organisms and stored for extended period, as are DDT and its derivatives, may, therefore, be concentrated greatly up the food chain" (App. B-12)). This is particularly of concern to man who is of course, at the top of a food chain.

seriously threatened by present and anticpated future concentrations of DDT residues in the tissues of the fish.[55]

DDT residues do great damage to useful invertebrates of many species. Insect communities are frequently disrupted by the killing of beneficial predatory and parasitic insects, thereby aggravating the insect pest problem DDT was intended to control. DDT kills pollinating insects. It damages various crustaceans such as crabs and shrimp (App. B-16). Even the base of oceanic food chains, the phytoplankton, can have their photosynthetic activity reduced by a few parts per billion of DDT in the water (App. B-6, 15).

The indirect cost to society of this degradation reaches the incalculable (App. B-18). It is not at all surprising that the Mrak Commission, "after carefully reviewing all available information" (App. B-2);

> * * * concluded that there is adequate evidence concerning potential hazards to our environment and to man's health to require corrective action. Our Nation cannot afford to wait until the last piece of evidence has been submitted on the many issues related to pesticide usage. We must consider our present course of action in terms of future generations of Americans and the environment that they will live in.

These facts undoubtedly explain why the use of DDT on raw agricultural commodities is increasingly being prohibited by governmental authorities.[56]

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[55] It was DDT contamination of coho salmon that led to the establishment of the Mrak Commission.

[56] For example restrictive action has been ordered by the States of Arizona, California, Florida, Maryland, Michigan and Wisconsin, the Canadian federal government and several of the provinces, and by Sweden.

CONCLUSION

In light of the uncontroverted evidence that DDT is a carcinogen, this proceeding should be remanded to the Secretary with directions that he immediately take all action that is necessary to effect the elimination of that poison from raw agricultural commodities. Administrative proceedings conducted following remand should not be concerned with whether it is appropriate to continue, for any period of time, using DDT; rather, the Secretary should consider only the solution that should be implemented to afford the consuming public the greatest possible protection from continued exposure to that cancer-producing poison.

Respectfully submitted,

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February, 1970.

IN THE

UNITED STATES COURT OF APPEALS

FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 23,813

ENVIRONMENTAL DEFENSE FUND, INCORPORATED; SIERRA CLUB; WEST MICHIGAN ENVIRONMENTAL ACTION COUNCIL; NATIONAL AUDUBON SOCIETY, and IZAAK WALTON LEAGUE OF AMERICA,
Petitioners,

v.

CLIFFORD M. HARDIN, Secretary of Agriculture, and UNITED STATES DEPARTMENT OF AGRICULTURE,
Respondents.

Petition for Review of Order of the United States Department of Agriculture

BRIEF FOR PETITIONERS

JURISDICTION

The jurisdiction of this Court rests on Section 4d of the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, 7 U.S.C. § 135b(d), 61 Stat. 168, as amended by 78 Stat. 190.

ISSUES PRESENTED FOR REVIEW

1. Whether Respondents have erred in denying Petitioners' request that they issue notices under Section 4c of the Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. § 135b(c), to commence administrative proceedings by which the registrations of all economic poisons containing DDT could be cancelled, where (a) the Respondents have found that widespread DDT use should be discontin-

ued, and (b) the evidence before the Respondents compels such a finding.

2. Whether Respondents have erred in denying Petitioners' request that they suspend DDT registrations immediately for the duration of Section 4c cancellation proceedings where the evidence before Respondents is that DDT is an imminent hazard to the public.

3. Whether the Petitioners have standing to obtain review.

4. Whether there is a reviewable order before the Court.

PREVIOUS CONSIDERATION BY THIS COURT

This cause was previously before a panel including Chief Judge Bazelon and Judge Robinson on Respondents' Motion To Dismiss and Respondents' Motion for Reconsideration of Order Deferring Ruling on Motion To Dismiss. An order was entered on January 29, 1970, deferring consideration of the Motion To Dismiss. A related cause, *Environmental Defense Fund, Inc. v. Finch,* No. 23812, involving many of the same factual issues, is also before this Court for consideration at this time.

REFERENCES TO RULINGS

The Order of December 11, 1969, of the Respondents, including four attachments, is set forth at pp. 36-45 of the Appendix hereto.

STATUTES AND REGULATIONS INVOLVED

Sections 2-4 of the Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. §§ 135-135b, 61 Stat. 168, as amended by 78 Stat. 190, is attached as an addendum to this brief.

STATEMENT OF THE CASE

The Parties. The Petitioners are five groups actively engaged in environmental protection. Their activities include a long-term involvement in efforts to control the environmental pollution caused by DDT and other persistent pesticides. They have participated in proceedings in a variety of jurisdictions to limit the use of DDT.

The Environmental Defense Fund is made up of scientists and other citizens dedicated to the protection of the environment on behalf of the public, employing legal action where necessary. It has participated in hearings on DDT in various jurisdictions. Its Scientists Advisory Committee, with more than 200 members, including some of the world's foremost environmental scientists, assures that positions taken are thoroughly supported by scientific evidence. (App. 1-2). The Sierra Club, which has a membership of 80,000, is devoted to the preservation of scenic resources, forests, waters, wildlife and wilderness. The Sierra Club has participated in several citizens' campaigns and legal actions to preserve the environment and has become well known for these efforts. (App. 2). The National Audubon Society, which has 80,000 members, is devoted to the protection of wildlife and the natural environment. An example of Audubon's many activities is the ownership and operation of 40 wildlife refuges. (App. 2-3). The West Michigan Environmental Action Council has a membership of 25 civic organizations and 300 individual members, and is devoted to protecting and restoring the quality of the environment. (App. 3) The Izaak Walton League has a nationwide membership of 50,000. The League has long had a special interest in and an active program to protect aquatic habitats. Because of its concern with the effects of DDT on aquatic organisms, it has participated in state and local proceedings to curb the use of DDT. (Motion To Intervene of Izaak Walton League.)

The Respondents (hereinafter sometimes called "Agriculture") have primary responsibility for the regulation of

pesticides in the public interest. The Secretary of Agriculture has delegated responsibility for the regulation of pesticides to the Pesticides Regulation Division, a branch of the Agriculture Research Service. No pesticides may be sold in interstate commerce unless they are registered with Respondents pursuant to the terms of the Federal Insecticide, Fungicide and Rodenticide Act[1] (hereinafter cited as "FIFRA"). Respondents have authority under that Act to cancel the registration of pesticides causing harm and injury to man, animals and the environment. In case of imminent hazard to the public, Respondents have authority to summarily suspend DDT registrations.

Petition Submitted to Respondents. Petitioners requested by a formal petition filed on October 31, 1969, that Respondents initiate proceedings under Section 4c of FIFRA[2] to cancel DDT registrations. (App. 1-19) (Such proceedings are initiated by the issuance of notices to registrants, which will hereinafter be referred to as "Section 4c Notices".) Petitioners made their request on the ground that pesticides containing DDT are not in compliance with the standards of FIFRA; in particular that DDT is causing immediate, serious, permanent and irreparable injury to man, the environment, and animals, including fish and wildlife. Petitioners also requested the immediate suspension of DDT registrations under Section 4c for the pendency of cancellation proceedings on the ground that DDT is an "imminent hazard to the public." Suspension is intended to protect the public by removing immediate hazards from the market during lengthy deregistration proceedings (see pp. 24-26, *infra*).

The Petition described in detail the evidence concerning the harm caused by DDT (App. 12-16), citing numerous scientific articles and an Affidavit of Dr. Charles F. Wurster, a professional environmental scientist. (App. 28-32) A submission

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[1] 7 U.S.C. § 135 *et seq.*, 61 Stat. 168, as amended.

[2] 7 U.S.C. § 135b(c), 61 Stat. 168, as amended by 78 Stat. 190.

containing, among other things, a bibliography of 268 articles on DDT prepared by the Environmental Defense Fund accompanied the Petition.

The facts before the Respondents were contained in Petitioners' submissions and three reports of blue ribbon scientific committees appointed by government agencies: (1) Report of November, 1969, of the Commission of the Secretary of Health, Education and Welfare on Pesticides and their Relationship to Environmental Health (hereinafter cited as the Mrak Report),[3] which recommended that all uses of DDT[4] be eliminated except where essential to preserve human health and welfare (App. 34, 41, 43); (2) Report of the President's Science Advisory Committee of May 15, 1963, which called for the elimination of persistent pesticides (App. 40, 43); and (3) Report of May, 1969, of a Committee of the National Research Council, recommending immediate attention to the environmental problems of persistent pesticides. (App. 34, 41, 43) These reports, and, in particular, the Mrak Report, represent major fact-finding efforts

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[3]The Mrak Report's list of Commission members, staff members, advisors and contributors fills 12 pages (Mrak vi-xvii). Dr. Emil Mrak, Chancellor Emeritus of the University of California at Davis, was Chairman of the Committee. The report is 677 pages long. In preparing the report, over 5,000 references to scientific research were reviewed and evaluated (Mrak 5). It is a document on pesticides of unique scope and comprehension.

Because of the importance of the Mrak Report to this cause, Petitioners have lodged five copies with the Clerk. The Department of Health, Education and Welfare, in the case of *Environmental Defense Fund v. Finch,* No. 23812, has also filed with the Court 25 copies of the Mrak Report.

[4]"DDT," sometimes called dichlorodiphenyltrichloroethane, is a mixture of substances which has as its major ingredient chemical compound, 1,1,1-trichloro-2, 2-bis-(*p*-chlorophenyl)ethane. "DDT residues" include DDT; DDE, 1, 1-dichloro-2, 2-bis(*p*-chlorophenyl) ethylene; DDD, also known as TDE, 1,1-dichloro-2, 2-bis-(*p*-chlorophenyl)ethane; and several other closely related chemical compounds derived from DDT by conversion processes within the environment. (App. 3)

on the part of governmental agencies. Facts regarding DDT on all essential points in this cause are dealt with in the Mrak Report. Petitioners will therefore cite specifically the Mrak Report where relevant.

DDT is a pesticide widely used for pest control in a variety of agricultural and non-agricultural situations. It is often used against insects and other pests in connection with tobacco, cotton, shade trees, forest trees, fruit trees, vegetables, and animals. In many cases, the use of DDT is not related to protecting human health or producing food.

One of the most important characteristics of DDT is its persistence in the environment. (App. 28, Mrak 103-104) Unlike many other pesticides, DDT is not broken down to non-toxic compounds by biological processes.

DDT is causing serious, permanent and irreparable harm to man, wildlife resources and to the earth's ecosystem and environment. The harm is of a widespread and immediate nature. (See generally App. 12-16, 28-31, Mrak 206-212) DDT and its residues have characteristics (App. 12-13, 28, Mrak 187) that cause it, when released into the environment, to accumulate in the tissue of non-target organisms (including man) (App. 12-13, 28, Mrak 187, 321-344) and concentrate in food chains. (App. 13, 28, Mrak 187) DDT has been in common use since World War II. (Mrak 45-46) Today more than 100 million pounds of DDT is manufactured and released into the environment each year. (App. 28, Mrak 48) As a result, the entire biosphere has become contaminated with DDT residues. (See generally Mrak 99-176)[5] DDT and DDT residues are contaminants of human foods, including many foods never treated with DDT (App. 13, 29, Mrak 136-140), and contaminate the tissues of virtually all human beings. (App. 13, 28, Mrak 321-341)

DDT has been proven a cancer-causing agent in test animals in a definitive study supported by the National Cancer

[5]DDT contaminates such diverse elements in the environment as air, rainwater, sea birds, antarctic animals, cosmetics and human milk. (App. 13, 29, Mrak 114, 116, 213)

Institute (App. 15-16, Mrak 470-472, 481-483) confirming earlier evidence. (App. 16, 30-31) The Mrak Report noted:

> ". . . a remarkable degree of concurrence has been found to exist between chemical carcinogenesis in animals and that in man where it has been studied closely." (Mrak 482)

Another study found human victims of terminal cancer to contain more than twice the concentration of DDT residues in their fat than did victims of accidental death. (App. 16, 30-31, Mrak 495)

DDT is also endangering the reproduction and survival of many non-target organisms. (Mrak 179, 189, 206-212) For example, DDT and DDT residues are a major hazard to bird populations, causing direct death, reproductive failure and, in some species, catastrophic declines approaching extinction. (App. 13-14, 29, Mrak 179, 189, 211-212) DDT likewise is causing direct kills and reproductive failures of fish, threatening important freshwater and marine fisheries. (App. 14, 29, Mrak 209-210) DDT and DDT residues are also causing great damage to useful invertebrates of many species (App. 14-15, 30, Mrak 206-209) and are causing a variety of other ecological and environmental damage. (App. 15, 30, Mrak 189, 206-209)

The tragedy of DDT is compounded by the fact that alternative pest control techniques, particularly integrated techniques, are available for all DDT uses, which would not pose the same threats to the environment and to human health as DDT. (App. 16, Mrak 161-168)

Order of Respondents. On December 11, 1969, Respondents denied Petitioners' request for immediate suspension and substantially denied Petitioners' request to commence cancellation procedures under Section 4c of FIFRA. (App. 34-45)[6] Respondents took the following actions:

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[6]Respondents' order consisted of a letter to Petitioners (App. 34-35) that incorporated by reference two notices: (1) Pesticide Registration Notice 69-17, dated November 20, 1969, initiating procedures to cancel registrations for the sale of DDT for four uses. (App. 40-42)

1. Denied Petitioners' request for immediate suspension of all uses of DDT;

2. Denied Petitioners' request for issuance of Section 4c notices for all economic poisons containing DDT. The Respondents issued a Section 4c notice for four uses of DDT: tobacco, shade trees, household uses, and, with exceptions, aquatic uses. Respondents did not disturb approximately 100 other uses of DDT;

3. Solicited comments concerning the approximately 100 other uses of DDT.

Respondents' determination of December 11, 1969, (App. 34-43) embodies their decision, states their findings and their reasons, and recites the evidence upon which their action was taken. The Mrak Report and the other government reports mentioned above (pp. 5-6) were explicitly relied on. (App. 35, 40-41, 43) Respondents found that the discontinuation of widespread use of DDT was warranted. (App. 41, 43-44) The notices referred to the extensive use of DDT, its persistence and the resulting environmental contamination. (App. 40, 43) It was specifically stated that the Respondents were taking action "to assure greater protection of the environment." (App. 35) The Respondents stated that their determination of December 11, 1969, together with the related action referred to therein, constituted their response to Petitioners' request. (App. 35)

The determination denied the relief sought by Petitioners (except in small part for four uses of DDT). Section 4c notices were not issued for most uses of DDT and no product containing DDT or any use of DDT has been suspended.

This is a Section 4c notice for these four uses which initiates the FIFRA cancellation procedure and is of the type Petitioners sought for all economic poisons containing DDT. Thus, the issuance of this Section 4c notice granted partial relief to Petitioners. (2) Notice published in the Federal Register on November 25, 1969 (34 F.R. 18827) inviting views and comments for a period of 90 days in regard to other uses of DDT. (App. 43-45)

Proceeding in this Court. Petitioners sought review in this Court on December 29, 1969, asking the following relief:

> (a) That the order of December 11, 1969, in response to the Petition of October 31, 1969, be set aside;
>
> (b) that the Respondents be ordered to follow statutory procedures, issuing § 4c notices to commence the procedures by which the registrations of all economic poisons that contain DDT could be cancelled; and
>
> (c) that the Respondents be ordered to immediately suspend the registration of all economic poisons that contain DDT during § 4c proceedings.

Because of the urgency of Petitioners' cause, Petitioners moved, on December 29, 1969, that the matter be advanced on the docket and expedited. Respondents moved on January 12, 1970, to dismiss for lack of jurisdiction. Petitioners filed their Opposition thereto on January 22, 1970. On January 29, 1970, this Court, noting "the urgency of petitioners' complaint and the importance of the public safety considerations which it raises," granted Petitioners' Motion to Expedite and ordered that the jurisdictional questions raised by Respondents be deferred for consideration with the merits.

On February 2, 1970, Respondents moved for reconsideration of the Court's January 29 order and announced to the Court that they would not need the period allotted to file a brief and would rest completely on their Motion to Dismiss. (Motion to Reconsider, p. 6) Respondents urged the Court, should it deny the Motion to Reconsider, to set the cause down for oral argument as soon as possible following the filing of Petitioners' brief.

ARGUMENT

I.

RESPONDENTS HAVE ERRED IN DENYING PETITIONERS' REQUEST THAT THEY ISSUE NOTICES UNDER SECTION 4c OF FIFRA TO COMMENCE ADMINISTRATIVE PROCEEDINGS BY WHICH REGISTRATIONS OF ALL ECONOMIC POISONS THAT CONTAIN DDT COULD BE CANCELLED

The Respondents denied Petitioners' request that they issue Section 4c notices for all economic poisons containing DDT. Respondents, however, are required by FIFRA to issue such notices at this time because (a) they have made a finding that widespread DDT use should be discontinued, and (b) because the evidence before them compels a finding that DDT use should be discontinued.

A. The Respondents Must Issue Section 4c Notices Because They Have Made a Finding That Widespread DDT Use Should Be Discontinued

FIFRA was passed in 1947 to protect the public from harmful or ineffective pesticides and other economic poisons, *i.e.*, substances intended for pest or weed control.[7] The Act was amended in 1964 to better protect the public by closing loopholes which had permitted manufacturers to market unsafe products. The amendment gave Agriculture effective means of refusing, cancelling, and suspending registrations.[8] Specifically, FIFRA sets out standards and procedures with regard to pesticides to "protect the public"[9]

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[7]FIFRA § 2a; 7 U.S.C. § 135(a), 61 Stat. 163 (1947); House Report No. 313, 80th Cong., 1st Sess. (1947); 109 Cong. Rec. 20079 (Statement of Senator Ellender), 88th Cong., 1st Sess. (1963).

[8]See, *e.g.*, Senate Report No. 573 (on S. 1605), 88th Cong., 1st Sess. (1963); House Report No. 1125 (on H.R. 9739), 88th Cong., 2d Sess. (1964); 110 Cong. Rec. 2948-49, 88th Cong., 2d Sess. (1964); 110 Cong. Rec. 7189, 88th Cong., 2nd Sess. (1964); 109 Cong. Rec. 20079, 88th Cong., 1st Sess. (1963).

[9]FIFRA § 2(z)(2), 7 U.S.C. § 135(z)(2)(c), 61 Stat. 166, as amended by 73 Stat. 287.

and "prevent injury to living man and other vertebrate animals, vegetation and useful invertebrate animals."[10]

Economic poisons—including DDT—are required to be registered with the Secretary of Agriculture prior to sale in interstate commerce.[11] They cannot, however, be registered unless they are properly labeled. Economic poisons are "misbranded" for these purposes if the label is not adequate, if complied with, to avoid injury to the public and to man, animals, and the environment. If no label can be written which will prevent such injury, an economic poison is inherently misbranded and cannot be registered or sold in interstate commerce.[12]

Upon a preliminary finding that an economic poison is not in compliance with FIFRA, a Section 4c notice is issued to the registrant. The Section 4c notice issued upon such a preliminary finding triggers an administrative procedure which can lead to cancellation. The registrant can, under Section 4c, challenge the Secretary's preliminary determination through administrative procedures which include a reference to an advisory committee of qualified experts selected by the National Academy of Science and a public hearing before an examiner. At the end of such procedures, the Secretary decides whether or not to cancel the registration.

The issuance of a Section 4c notice is not equivalent to a final determination that registration must be cancelled. Indeed, Congress, in reviewing the administration of FIFRA, stressed that the Secretary of Agriculture should issue a Section 4c notice *"whenever a reasonable question as to*

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[10] FIFRA § 2(z)(2)(d) and (g), 7 U.S.C. § 135(z)(2)(d) and (g), 61 Stat. 166, as amended by 73 Stat. 287.

[11] FIFRA § 4(a)-(c), 7 U.S.C. § 135b(a)-(c), 61 Stat. 167-168, as amended.

[12] FIFRA § 135(z)(2)(c) & (d), 7 U.S.C. § 135(z)(2)(c) & (d); see also 7 C.F.R. §§ 362.9, 362.10(k), 362.105(c), 362.105(h), 362.106(f)(4)(v), 362.108(c)(6) and 362.121(g).

the safety of a registered product becomes apparent." "Deficiencies in Administration of the Federal Insecticide, Fungicide and Rodenticide Act," House Rept. 91-637, 91st Cong., 1st Sess., Nov. 13, 1969, p. 19 (emphasis in original). In the course of the subsequent administrative proceedings the Secretary of Agriculture has an opportunity to weigh all competing considerations and then make a final determination on cancellation.

It is plain that there is "a reasonable question as to the safety of" DDT. Indeed, the Respondents have found that environmental considerations warrant the discontinuation of widespread use of DDT. The Respondent specifically found (App. 41, 43-44).

> "Current information on levels of DDT in the environment warrant the discontinuation of widespread use of DDT when such use is not essential in the production of food or the protection of health."

Having made a finding that the widespread use of DDT should be discontinued, the Respondents have a duty to issue Section 4c notices for all economic poisons containing DDT.[13] This is the only way in which the procedure for cancellation of DDT registration can be started.

While calling for general discontinuation of DDT use, Respondents' finding leaves open the possibility that some uses of DDT might be permitted in unusual circumstances. Such questions are of the type which would properly be considered administratively *after* issuance of Section 4c notices.

There is no rational basis at this stage of the proceedings upon which the Respondents could limit their action to four uses of DDT and leave all other uses unaffected. Respondents' finding that widespread use of DDT should be discontinued applies with equal force to all DDT uses. One cannot properly make such a sweeping finding and

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[13] Section 4c provides that "Whenever the Secretary . . . determines that registration of an economic poison should be cancelled, he shall notify . . . the registrant." 7 U.S.C. § 135b(c).

then apply it to only four out of 100 DDT uses. DDT's mobility, solubility, and persistence characteristics (App. 12-13, 28, Mrak 187) make it irrelevant as to where it is injected into the ecological system—whether it is sprayed on tobacco or on cotton.

Moreover, there is no justification for Respondents' refusal to issue Section 4c notices for DDT use on such products as cotton, lumber products, woolens, and lawns. Plainly, such uses have nothing to do with human health or food production. Respondents did issue Section 4c notices for four uses, but did not offer any explanation for the selection of these four uses or the exclusion of others.

Instead of issuing Section 4c notices for all uses of DDT, the Respondents have invited "views and comments" on about 100 uses. (App. 43-45) This comment procedure has no basis in FIFRA; it will be duplicated in the proceedings which follow issuance of Section 4c notices; and it adds a wholly unnecessary element of delay to the already protracted administrative procedures under Section 4c.

The invocation of this comment procedure is an example of the Respondents' failure to carry out the policy of FIFRA, which has been exhaustively documented by the Government Operations Committee of the House of Representatives (H.Rept. 91-637, p. 15, *supra*).[14] Among the administrative derelictions catalogued by the Government Operations Committee, the Committee noted:

> "*The Pesticides Regulation Division did not take prompt or effective cancellation action in cases where it had reason to believe a registered product might be ineffective or potentially hazardous (Emphasis in original)*

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[14]The procedure is the same as that indulged in by Respondents with regard to certain arsenicals.

"Despite the fact that a contested cancellation proceeding could take many months at best, the subcommittee found that in the case of certain arsenic compounds, USDA resorted to an unnecessary preliminary procedure which took two years before even starting cancellation proceedings." (H.Rept. 91-637 at 50)

> "Although PRD has had specific cancellation authority for more than 5 years, it has *never* secured cancellation of a registration in a contested case. (emphasis added)
>
> "The subcommittee investigation disclosed evidence of lengthy and unwarranted delays in initiating cancellation action after facts sufficient to justify such action became known to PRD."[15]

In fact, the Committee reported that Agriculture really took no action at all if a registrant contested a notice:

> "Until a few weeks ago, PRD did not even have procedures for conducting hearings or studies which registrants may request as a matter of right before cancellation action can become effective. When registrants receiving cancellation notices requested hearings or studies, prosecution of the cancellation action was halted and the product left on the market." *Ibid.*

B. Respondents Must Issue Section 4c Notices for Economic Poisons Containing DDT Because the Evidence Before Them Compels a Finding That DDT's Use Should Be Discontinued

As stated above (p. 12), the Respondents have made a finding that widespread DDT use should be discontinued. In addition, the evidence before the Respondents conclusively establishes that DDT is out of compliance with FIFRA standards and compels such a finding. A Section 4c notice must be issued when there is a preliminary finding that a pesticide does not comply with FIFRA and should be discontinued. In like fashion, Section 4c notices must issue where, as in this case, the requisite finding is compelled by evidence.

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[15]House Report 91-637, *supra* at 15-16.

As long as ten years ago, Justice Douglas noted the widespread effect of DDT on birds, wildlife and human health. He stated that these effects

> ". . . have led to increasing concern in many quarters about the wisdom of the use of this and other insecticides. The alarms that many experts and responsible officials have raised about the perils of DDT underline the public importance in this case." *Murphy v. Butler,* 362 U.S. 929, 933-934 (1960), dissenting opinion on denial of certiorari.

Scientists have in the intervening years established that DDT is even more damaging than previously believed.

The facts are, as set out by Petitioners' submissions to Agriculture and the Mrak Report (and summarized above, pp. 6-7), that DDT is causing widespread harm and injury to man, animals and environment. (App. 12-16, 28-31, Mrak 179, 189, 206-212) In addition, DDT is a cancer-causing agent (App. 15-16, 30-31, Mrak 470-472, 481-483, 495) that is now a general contaminant of the food and tissue of mankind. (App. 13, 28-29, Mrak 136-140, 321-341). It is clear that DDT does not meet the standards in FIFRA Section 2(z)(2)(c), (d) & (g), which protect the "public" and "man, vertebrate animals, vegetation and useful invertebrate animals" from injury.

Indeed, if Respondents failed to find that DDT does not comply with FIFRA, such failure would constitute an abuse of discretion. Respondents seem to suggest that they have absolute discretion. (Motion to Reconsider, p. 5) The legislative history of Section 4c of FIFRA makes it clear, however, that Respondents have a duty to protect the public from harmful pesticides (see p. 10, *supra*). The facts in this case are such that all the evidence bearing on the relevant factors—carcinogenicity, injury to animals, scope of contamination, persistence—compel a finding of noncompliance with FIFRA standards.

In making the finding that DDT is out of compliance with FIFRA and measuring any discretion of Respondents,

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it must be kept in mind that Congress intended Section 4c procedures to be a mechanism for placing the burden of proof on registrants, requiring them to prove to Respondents that economic poisons comply with FIFRA standards. Prior to the 1964 amendments,[16] a manufacturer could demand that his product be registered even if the Secretary of Agriculture objected. If the Secretary wished to attack such a protest registration, he had to file suit and assume the burden of proof in establishing that the product did not conform to FIFRA standards. The 1964 amendments abolished this practice and placed the burden of proving compliance on the registrant:

> "The purpose of this bill (H.R. 9739) is to end the practice of protest registration whereby the manufacturer of a pesticide can market a product despite Department of Agriculture doubts as to its effectiveness and safety.
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> "The principal effect of registration under protest is to shift the burden of proof from the registrant to the Government. If the product. . .is registered under protest, the Government has the burden of proving that the product does not comply with the Act.
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> * * *
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> "The bill will correct this situation and afford greater protection to the public by repealing the authority for registration under protest."[17]

Congresswoman Leonor Sullivan of Missouri stated on February 17, 1964:

> ". . . I am strongly in favor of the legislation now before you to require industry, rather than the Federal Government, to shoulder the burden of proof in

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[16] Amendments of May 11, 1964, Pub. Law 88-305, 78 Stat. 190.

[17] H. Rept. No. 1125 on H.R. 9739, 88th Cong., 2nd Sess., 64 U.S.C. Cong. & Ad. News 2166-2167.

connection with the marketing of pesticides which may be unsafe for use as intended.

* * *

"We must close any loopholes in the law which permit manufacturers to market products they cannot prove are safe in use in the manner intended. The burden of proof should not rest on the Government, because great damage can be done during the period the Government is developing the data necessary to remove a product which should not be marketed."[18]

Despite the fact, however, that FIFRA places the burden of proving pesticides to be safe on manufacturers, Agriculture does not base its decisions of cancellation on that principle. The government Operations Committee stated:

"A mistaken belief that positive evidence of hazard—rather than simply a lack of adequate assurance of safety—is necessary to support a cancellation action appears to have been a factor in PRD's failure to initiate such action in cases where it was obviously justified."[19]

The Committee revealed that Agriculture had registered 1,600 products objected to over a five-year period by the Public Health Service because of questions as to their safety. The Committee found that Agriculture was:

". . . in effect demanding that HEW supply scientific proof of hazard to support its objections rather than asking the would-be registrant to resolve any doubt

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[18] 110 Cong. Rec. 2948-9, 88th Cong., 2nd Sess., 1964. Also see debate, 110 Cong. Rec. 7189. Congresswoman Sullivan appeared before the Subcommittee of the House Agriculture Committee in support of the legislation. At that time, she was Chairman of the Subcommittee on Consumer Affairs of the House Banking and Currency Committee.

[19] House Report 91-637, *supra* at 16.

by providing adequate evidence of the products' safety."[20]

Because of its concern with Respondents' misallocation of the burden of proof and other deficiencies in enforcing FIFRA, the Government Operations Committee urged Respondents to "*. . . take appropriate steps to insure that cancellation proceedings are promptly initiated whenever a reasonable question as to the safety of a registered product becomes apparent.*"[21]

Petitioners reiterate that the facts in this case are that DDT is substantially out of compliance with FIFRA in that it is causing substantial injury to man, animals and the environment. The evidence in the record of the harm being caused by DDT compels Respondents to make a preliminary finding that DDT should be discontinued, and that Section 4c notices should be issued. In such circumstances the burden is on the registrant to come forward in a Section 4c proceeding and affirmatively prove the safety of their products. A failure to make a finding that DDT use should be discontinued would be an abuse of discretion.[22]

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[20]House Report 91-637, *supra* at 14; also see pp. 36-37.

[21]House Report 91-637, *supra* at 19 (emphasis in original).

[22]Petitioners note that several state agencies have recently found DDT to be injurious to man, animals and the environment. The Michigan Department of Agriculture cancelled, effective June 27, 1969, Michigan registrations of DDT (with three minor exceptions). Cancellation was based in part on the fact that DDT is injurious to vertebrates in violation of standards in Section 2(z)(2) of the Michigan Economic Poisons Act, 286.162 Mich. Comp. Laws Ann. § 2(z)(1)(2)a-(2)(h), which are parallel to the standards in Section 2(z)(2) of FIFRA.

California has taken action cancelling DDT registrations under provisions designed to protect the environment, man, animals and the public health and safety. See Sections 12824, 14005, Agriculture Code of California (Orders of October 20, 1969 and December 9, 1969, of California Department of Agriculture). Similar action has been taken in Illinois (see Illinois Pesticides Control Law, 5 Ill. Stat.

II

RESPONDENTS HAVE ERRED IN DENYING PETITIONERS' REQUEST THAT THEY SUSPEND DDT REGISTRATIONS IMMEDIATELY AND FOR THE DURATION OF SECTION 4c CANCELLATION PROCEEDINGS

Petitioners requested Agriculture to suspend DDT registrations immediately for the duration of Section 4c proceedings because of the immediacy and widespread nature of the harm it is causing. Respondents have denied Petitioners' request and refused to suspend the registration of any economic poison containing DDT.

The Suspension Clause of Section 4c reads as follows:

> "Notwithstanding any other provision of this section, the Secretary may, when he finds that such action is necessary to prevent an imminent hazard to the public, by order, suspend the registration of an economic poison immediately. In such case, he shall give the registrant prompt notice of such action and afford the registrant the opportunity to have the matter submitted to an advisory committee and for an expedited hearing under this section."

Respondents are compelled by the facts in this case to find that DDT is an imminent hazard to the public. The evidence in the case established that DDT is a cancer-causing agent (App. 15-16, 30-31, Mrak 470-472, 481-483) which is being widely dispersed through the environment. (App. 13, 29, Mrak 99-176), contaminating human food (App. 13, 29, Mrak 136-140) and tissue (App. 13, 28, Mrak 321-341). The evidence also establishes that DDT is causing serious harm to fish and wildlife populations (App. 13, 28, Mrak 179, 189, 206-212), and is bringing some species to the brink of extinc-

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Ann. § 87d.5); Florida (see Florida Law of July 9, 1969, Fla. Stat. § 487.042, Rule Section 7E-2-22 of December 17, 1969); Canada (see 114 House of Commons Debates 393, 28th Parliament, 2d Sess., Nov. 3, 1969); and Ontario (see Order-in-Council 3654/69 establishing Regulation 386-69 of September 24, 1969).

tion. The suspension provision is designed to protect the public from such hazards.

Because of the nature and extreme seriousness of the imminent hazard which is established by the facts of record, the Respondents are compelled to suspend DDT registrations.

A. Respondents Are Compelled To Find That DDT Is an Imminent Hazard to the Public

Harm to Wildlife. Justice Douglas noted the concern of experts and officials over the harmful effects of DDT on wildlife ten years ago.[23] That concern has now grown with the ever-increasing evidence that DDT threatens the destruction of whole species.

The evidence submitted by Petitioners to the Respondents, confirmed by the Mrak Report, is that DDT is causing ecological damage across a broad spectrum of life forms. As a result, we are in imminent danger of losing many species which have suffered catastrophic declines. Examples of prominent species which are now threatened are the national bird, the Bald Eagle, and the Peregrin Falcon (Mrak 211-212). Another serious threat is posed to important fresh and salt water fisheries. (App. 14, 29, Mrak 208-210).

The suspension provision was added to FIFRA to protect the public in these circumstances and in others. The legislative history of the suspension provision demonstrates that it was designed to protect fish and wildlife. The 1964 amendments were passed as a result of the concern generated by Rachel Carson's *Silent Spring.*[24] The Senate Agriculture Committee indicated that the suspension provisions were intended to encompass protection of fish and wildlife.[25]

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[23] *Murphy v. Butler, supra.*

[24] See statement of Senator Ribicoff, 110 Cong. Rec. 7189; Statement of Congressman Sullivan, 110 Cong. Rec. 2949.

[25] p. 3, S. Report No. 573, 88th Cong., 1st Sess. (1963).

In addition to their obligations under FIFRA, Respondents were given a special duty to protect wildlife in 1966 under the Endangered Species Act:[26]

> "It is further declared to be the policy of Congress that the Secretary of the Interior, the Secretary of Agriculture, and the Secretary of Defense, together with the heads of bureaus, agencies and services within their departments, shall seek to protect species of native fish and wildlife, including migratory birds that are threatened with extinction."

The Endangered Species Act calls on Respondents to act with special concern when fish and wildlife species are threatened with extinction. On the record of this case, Respondents are compelled to make the finding that such fish and wildlife species are faced with extinction and, therefore, that DDT is an imminent hazard.

Carcinogenicity. The undisputed evidence in the record of this cause is that DDT is a cancer-causing agent. (App. 15-16, 30-31, Mrak 470-472, 481-483). It is also the undisputed evidence that DDT is now found in virtually all human food and human flesh. (App. 13, 28-29, Mrak 136-140, 321-341).

Congress has, with the passage of the two Delaney Amendments to the Food, Drug and Cosmetic Act, declared as a national policy that cancer-causing agents are unsafe and are to be strictly banned from man's food. The first amendment of the Food Additives Amendment of 1958 provides:

> ". . . No additive shall be deemed to be safe if it is found to induce cancer when ingested by man or animal, or it is found, after tests which are appropriate for the evaluation of safety of food additives, to induce cancer in man or animal."[27]

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[26] 16 U.S.C. § 668aa *et seq.*, 80 Stat. 926.

[27] Section 409(c)(3)(A) of the Food, Drug and Cosmetic Act, 21 U.S.C. § 348(c)(3)(A), 72 Stat. 1785. The second Delaney clause was added as § 706(b)(5)(B) to the Food, Drug and Cosmetic Act in 1960

The Delaney Amendments operate to prevent any amount of a food additive or color additive from being added to food if such additive is a cancer-causing agent. This principle of total exclusion which takes away all discretion from officials of the Food and Drug Administration, is based on the fact that scientists have never found a threshold level for cancer-causing agents.

Secretary of Health, Education and Welfare, Arthur S. Flemming, in his testimony concerning the color additives amendment, which was adopted by the House Committee on Interstate and Foreign Commerce,[28] said:

> "The preponderance of scientific evidence clearly dictates our position: Our advocacy of the anticancer provision in the proposed color additives amendment is based on the simple fact that no one knows how to set a safe tolerance for substances in human foods when those substances are known to cause cancer when added to the diet of animals.
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> * * *
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> "Unless and until there is a sound scientific basis for the establishment of tolerances for carcinogens, I believe the Government has a duty to make clear—in law as well as in administrative policy—that it will do everything possible to put persons in a position where they will not unnecessarily be adding residues of carcinogens to their diet.
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> * * *
>
> "We have no basis for asking Congress to give us discretion to establish a safe tolerance for a substance which definitely has been shown to produce cancer when added to the diet of test animals. We simply have no basis on which such discretion could be exercised because no one can tell us with any assurance at all how to establish a safe dose of any cancer-producing substance."

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and is known as the Color Additives Amendment, 21 U.S.C. § 376 (b)(5)(B), 74 Stat. 399.

[28] H. Rept. No. 1761, 88th Cong., 2d Sess. (1960).

In *Bell v. Gooddard,* 366 F.2d 177, 181 (7th Cir. 1966), the Seventh Circuit stated:

> "The Delaney Clause, 21 U.S.C. § 348(c)(3)(A), provides that no additive 'shall be deemed to be safe if it is found to induce cancer when ingested by man or animal,' and is generally intended to prohibit the use of *any* additives which under any conditions induce cancer in *any* strain of test animal."

The policy of strict ban on cancer agents of the Delaney Amendments was applied to pesticides under the pesticide regulation law[29] administered by HEW, which is the companion of FIFRA. In 1959, the Food and Drug Administration seized a large quantity of cranberries sprayed with the agricultural poison, aminotriazole.[30] This action was based on scientific evidence that aminotriazole caused cancer. Secretary Flemming based his action on his administrative determination that the Delaney Amendment must be applied to pesticides, even though it was not specifically directed to them.[31]

Even though the Delaney clauses were not enacted as part of FIFRA, they established as policy the principle that carcinogens are to be kept strictly out of food. Even if the Delaney Amendments did not exist, however, it would not change the proposition that carcinogens in man's diet must be considered imminent hazards to the public. The evidence in this case compels the finding that DDT is a carcinogen which now occurs regularly in man's diet.

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[29] 21 U.S.C. § 346a, 68 Stat. 511. This section is the subject of the companion case before this Court, *Environmental Defense Fund, Inc., et al v. Finch, et al.*, No. 23812. With regard to the discussion of carcinogenicity, see generally Petitioners' Brief in No. 23812.

[30] See CCH Food, Drug and Cosmetic Law Reporter, § 59, 109.03.

[31] See the discussion of the cranberry episode in Brief for Petitioners, *Environmental Defense Fund v. Finch*, No. 23812.

B. Because of the Seriousness and Nature of the Facts Upon Which Respondents Are Compelled to Find DDT is an Imminent Hazard to the Public, They Are Compelled to Suspend DDT Registrations

As we have just shown, the evidence in this case compels findings that DDT is an imminent hazard to the public. Because of the nature and extreme seriousness of the hazards involved, immediate action on the part of Agriculture to suspend DDT registrations is required.

Respondents argue to the contrary (Motion to Reconsider, p. 5, note 4) that suspension is within their absolute discretion because Section 4(c) says "the Secretary *may* [suspend], when he finds that such action is necessary to prevent an imminent hazard to the public. . ." The word may, however, cannot be read to give Petitioners absolute discretion under these circumstances. It would make no sense to give Respondents discretion to ignore their own findings (or findings compelled by evidence before them) that a pesticide is an imminent hazard to the public. The suspension clause was placed in the Act to protect the public from serious injury. Congress did not intend for Respondents to sit idly by while that injury occurs.[32]

It is difficult to justify a claim of absolute discretion in light of the fact that the suspension provision was enacted to provide *immediate* relief to the public during Section 4c cancellation proceedings.[33] Congress was concerned because of the substantial delays built into the Section 4c procedure.

An uncontested cancellation is effective thirty days after service of the Section 4c notice. The registrant may, how-

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[32] "The burden of proof should not rest on the Government, because great damage can be done during the period the Government is developing the data necessary to remove a product which should not be marketed." Congresswoman Sullivan, 110 Cong. Rec. 2949, 88th Cong., 2d Sess., (1964).

[33] 109 Cong. Rec. 20079, 88th Cong., 1st Sess. (1963).

ever, request the matter be referred to an advisory committee or file objections and request a public hearing. Without going into specifics, which are set out in Section 4c, there are 360 days of built-in delay in these procedures, not including the unspecified time needed to form advisory committees, to prepare for and hold hearings, and to obtain judicial review.

The delays inherent in Section 4c have been compounded by Agriculture's actual practice. For example, in the Section 4c proceedings initiated for the four uses of DDT, the Stouffer Chemical Company requested on December 19, 1969, that the matter be referred to an advisory committee. As of the date of this brief, however, almost two months later, no such advisory committee has been appointed. In addition, while several other manufacturers requested a public hearing with regard to their products on December 19, 1969, no hearing examiner has been appointed. In fact, Respondents have not even filed an answer to the manufacturers' objections which is required by their own rules within 20 days (7 C.F.R. 364.23(a), 34 F.R. 13823 (Aug. 29, 1969)).

Unlawful delay by Agriculture in Section 4c proceedings, the House Government Operations Committee has found, is Agriculture's norm.[34]

Such delays in cancellation procedures would, perhaps, be tolerable to the public if Respondents suspended poisons in accordance with the obvious Congressional intent. Among the criticisms leveled at Agriculture by the Government Operations Committee, however, was that it failed to take action to remove hazardous products from the market. (H. Rept. 91-637, *supra*, at 8-9, 16, 52-54). In fact, Agriculture has only used its suspension power once, and then to no effect:

> "PRD has no procedures or criteria for determining when a registration should be suspended on the ground that a product constitutes an 'imminent

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[34]See p. 13-14, *supra*.

> hazard' to the public. Such action has been taken only once; but a product containing an identical ingredient was allowed to remain on the market without even bearing a required warning notice on its label." (House Report, p. 16.)

If the Respondents cannot be made to carry out their duty under FIFRA in a case as blatant as this, the suspension provision will certainly continue in disuse. And, what is worse, the public will have to suffer the havoc of many more millions of pounds of DDT waiting for Agriculture to act.

III

PETITIONERS HAVE STANDING TO OBTAIN REVIEW

Generally speaking, those persons whose interests a statute is designed to protect have standing under that statute to protect those interests. *Hardin v. Kentucky Utilities Co.*, 370 U.S. 1 (1968); *Curran v. Laird*, ___App. D.C. ___, ___ F.2d (No. 21,040 D.C. Cir., Nov. 12, 1969 (en banc)). When the interest a statute protects is one which is not easily identifiable with any particular group, the courts have granted standing on behalf of the public to those persons who by their activities and conduct exhibit a special interest in the area protected by the statute in question. The two leading decisions on this point are *Office of Communication of the United Church of Christ v. Federal Communications Commission*, 123 App. D.C. 328, 359 F.2d 994 (1966), and *Scenic Hudson Preservation Conference v. Federal Power Commission*, 354 F.2d 608 (2d Cir. 1965).[35]

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[35] Also see *Nashville I-40 Steering Committee v. Ellington*, 387 F.2d 179, 182 (6th Cir. 1967); *Norwalk Core v. Norwalk Redevelopment Agency*, 395 F.2d 920 (2nd Cir. 1968); *Road Review League, Town of Bedford v. Boyd*, 270 F. Supp. 650, 660-61 (S.D.N.Y. 1967); *Citizens Committee for the Hudson Valley v. Volpe*, 302 F. Supp. 1083 (S.D.N.Y. 1969); *Powelton Civic Home Owners Ass'n v. Department*

FIFRA is designed to protect the public from pesticide hazards, and, in fact, Congress intended that public groups concerned with those hazards would participate in FIFRA proceedings. Petitioners have shown the special interest in environmental protection to make their participation proper on behalf of the public.

A. FIFRA Contemplates Public Participation in its Proceedings

FIFRA was originally passed to protect the public from harmful pesticides.[36] Section 4d was added to FIFRA by the 1964 amendments,[37] the purpose of which was to better protect the public from pesticide hazards by closing the protest registration loophole and by tightening generally administrative procedures. (see pp. 15-17, *supra*).[38] The House Agriculture Committee Report stated:

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of Housing and Urban Development, 284 F. Supp. 809, 821-828 (E. D. Penn. 1968); *Parker v. United States*, ___ F. Supp. ___ (No. C-1368, D.C. Colo., Dec. 24, 1969); *Sierra Club v. Hickel*, ___ F. Supp. ___ (No. 51464, N.D. Calif., July 23, 1969). Three District Courts have upheld the standing of the Sierra Club in environmental suits, including two involving Agriculture. *Parker v. United States, supra+; Sierra Club v. Hickel, supra+,* and *Citizens Committee v. Volpe, supra.* (+Copies submitted to Court with Opposition to Motion to Dismiss). Scholarly comment on this subject approves the position taken in these cases. See Berger, *Standing to Sue in Public Actions: Is it a Constitutional Requirement,* 78 Yale L.J. 816 (1969); Rogers, *The Need for Meaningful Control in the Management of Federally Owned Timberlands*, 4 Land & Water L. Rev. 121 (1969); Allen, *The Congressional Intent to Protect Test: A Judicial Lowering of the Standing Barrier*, 41 Colo. L. Rev. 96 (1969); Jaffee, *The Citizen as Litigant in Public Actions: The Non-Hohfeldian or Ideological Plaintiff*, 116 U. Pa. L. Rev. 1033 (1968); Reich, *The Law of the Planned Society*, 75 Yale L.J. 1227 (1966).

[36] House Report No. 313, 80th Cong., 1st Sess. (1947).

[37] Act of May 12, 1964, 78 Stat. 190.

[38] See, *e.g.*, Senate Report No. 573 (on S. 1605), 88th Cong., 1st Sess. (1963); House Report No. 1125 (on H.R. 9739), 88th Cong.,

> "The bill will. . .afford protection to the public by repealing the authority for registration under protest."[39]

Repealing the protest registration provision had the effect of requiring:

> ". . .industry rather than the Federal Government to shoulder the burden of proof in connection with the marketing of pesticides which may be unsafe for use as intended."[40]

The fact that FIFRA and its 1964 amendments were designed to protect the public is sufficient to confer standing on those who have a special interest in environmental pollution and health. The language of Section 4d of FIFRA[41] and its legislative history specifically confirm this result.

Section 4d of FIFRA provides judicial review for "*any person* who will be adversely affected."[42] An attempt by the National Agricultural Chemical Association to substitute the language, "the applicant for registration, or registrant," for the term "any person. . .adversely affected," was rejected. See p. 49, Hearings, *Regulation of Economic Poisons,* August 21 and 22, 1963, Subcommittee on Departmental Oversight and Consumer Relations of the Committee on Agriculture.[43]

2d Sess. (1964); 110 Cong. Rec. 7189, 88th Cong., 2d Sess. (1964); 109 Cong. Rec. 20079, 88th Cong., 1st Sess. (1963).

[39]House Report No. 1125 (on H.R. 9739), 88th Cong., 2d Sess., 64 U.S. Code, Cong. & Ad. News 2167.

[40]Leonor K. Sullivan, 110 Cong. Rec. 7189, 88th Cong., 2d Sess. (1964).

[41]7 U.S.C. § 135b(d).

[42](Emphasis added) In addition, the Administrative Procedure Act, 5 U.S.C. § 702, provides review for anyone "adversely affected or aggrieved by agency action under the meaning of a relevant statute."

[43]88th Cong., 1st Sess., Aug. 21-22, 1963.

The colloquy which occurred when the amendment was offered shows conclusively that Congress intended that the proper representatives of the public were intended to have standing:

> Parke C. Brinkley (President of the National Agricultural Chemical Association): "It refers to the appeal and lets anybody who wants to do it, whereas this amendment would confine it to the person whose company is actually involved.
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> * * *
>
> Congressman Hagen: "Your amendment excludes The American Medical Association, for example, from requesting public hearings?
>
> Robert L. Ackerly (counsel with Mr. Brinkley): "Yes; that is true.
>
> Hagen: "It is merely a matter between the Department and the Company?
>
> Ackerly: "That is correct. . . .
>
> Hagen: "But the public, in effect, would be excluded from participating?
>
> Ackerly: "The public would be excluded from participating in this procedure; that is correct.
>
> * * *
>
> Congressman Harvey: "I think it is generally common knowledge that many of the trade-named pesticides have come about as a result of work by the research division of the Department of Agriculture. They have made research findings available to the companies who, in turn, have marketed them under trade names.
>
> "It would seem to me. . .if such a condition is set up in which the Secretary of Agriculture and the Company in question are in this situation, that they would be both on the same side of the issue." (Hearings, pp. 49-51)

In addition to the legislative history, the language in FIFRA, which provides jurisdiction for "any person. . . adversely affected," is very close to the language involved in *United Church of Christ* and *Scenic Hudson Preservation Conference.*[44] In those two cases, the Court held that this language conferred standing on organizations representing the public. Petitioners believe this Court's statement on standing in *United Church of Christ* is in fact even more suitable to this case:

> "The theory that the Commission can always effectively represent the listener interests in a renewal proceeding without the aid and participation of legitimate listener representatives fulfilling the role of private attorneys general is one of those assumptions we collectively try to work with so long as they are reasonably adequate. When it becomes clear, as it does to us now, that it is no longer a valid assumption which stands up under the realities of actual experience, neither we nor the Commission can continue to rely on it. The gradual expansion and evaluation of concepts of standing in administrative law attests that experience rather than logic or fixed rules has been accepted as the guide. 359 F.2d at 1003-1004.

B. The Petitioners Have Exhibited the Requisite Interest in DDT

The Petitioners have, by their activity and conduct, exhibited the proper interest in the problems involved in this case to represent the public. The Petitioners are four national organizations and one local organization with active programs in the areas of environmental protection and wildlife conservation. Together, Petitioners represent, among their members alone, two hundred thousand concerned citizens. They have shown a strong interest in pesticide problems in general and DDT problems in particular. They have taken various legal and administrative actions dealing

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[44] Also see the cases and authorities cited in note 35, p. 26, *supra.*

with DDT. (App. 1-3, Motion to Intervene of Izaak Walton League)

In *United Church of Christ,* the Church was held to represent the interest of the listening public. In *Scenic Hudson,* conservation groups, including Petitioner Sierra Club, were held to represent the interests of the public in scenic beauty and wildlife conservation. So equally here Petitioners represent the interest of the public in the protection of man, animals and the environment from the hazards of pesticide pollution.

The Respondents contend that environmental protection groups have no place in the decision-making process concerning pesticides. They contend that Department of Agriculture and the pesticide companies should be left to safeguard the nation's environment. Judicial review would be limited to the aggrieved manufacturer if the Respondents ever cancelled a pesticide registration. Petitioners submit that this view of the scheme of pesticide regulation and of the administrative process must be rejected.

IV

THERE IS A FINAL ORDER BEFORE THE COURT FOR REVIEW

Petitioners requested Agriculture to do two things: (1) issue Section 4c notices to begin cancellation proceedings for all economic poisons that contain DDT; (2) suspend all DDT registrations immediately and for the duration of § 4c cancellation proceedings. Agriculture granted partial relief with regard to the Section 4c notices by issuing such a notice for four uses, but denied the relief sought for all other uses. Agriculture denied all relief as to suspension, refusing to suspend DDT or any use thereof.

Respondents' denial of Petitioners' request is embodied in an order of December 11, 1969, which takes the form of a letter. This letter incorporates by reference other documents of which the most important are the Section 4c notice regarding the four uses and the Federal Register

Notice for all other uses. (App. 34-45; see pp. 6-7, *supra.*) These documents together embody Respondents' finding and decision, and refer to the evidence upon which they rely. They deny the relief Petitioners seek. Indeed, Respondents admit (Motion to Reconsider, p. 5, note 4) that they have made a decision not to suspend.

Respondents' order denying the relief sought is a final order which is subject to review by this Court because Petitioners have no further steps they can take in the administrative process. Denial of review will leave Petitioners to await the whim of the Respondents who, in their view, will have no legal obligation to advance the matter to another stage.

The fact that this final order does not come at the end of a Section 4c proceeding is of no consequence. Section 4d of FIFRA provides for review "[in] case of actual controversy as to the validity of any order." The Administrative Procedure Act, 5 U.S.C. 551(b), defines "order" as:

> ". . . the whole or a part of a final disposition, whether affirmative, negative, injunctive, or declaratory in form, of an agency in a matter other than rule-making but including licensing."

Respondents' order makes a final disposition of Petitioners' requests.

In their motion papers, Respondents seem to raise four issues with regard to their order: (1) that the order does not come at the end of a Section 4c proceeding; (2) that the order is not based on a record that would be developed by the end of a Section 4c proceeding; (3) that Section 4c proceedings are underway for four uses; and (4) that the order involves, in part, a letter.

A. Respondents' Order Is a Final Reviewable Order Even Though It Does Not Come at the End of Section 4c Proceedings

The requirement of "finality" is to be interpreted in "a pragmatic way." *Abbott Laboratories v. Gardner,* 387 U.S. 136, 149 (1967). "Whether or not the statutory requirements of finality are satisfied in any given case depends. . . upon a realistic appraisal of the consequences of such action." *Isbrandtsen Co. v. United States,* 93 App. D.C. 293, 211 F.2d 51, 55 (1954). Of key importance is the principle stated in *Cities Service Gas Co. v. F.P.C.,* 255 F.2d 860, 863 (10th Cir. 1956), that:

> "An order of an administrative body is reviewable when action taken in advance of hearings or adjudication result in setting legal consequences."[45]

It is of no consequence that an order is issued prior to the end of the proceedings.[46] Courts of Appeals may review final orders which do not come at the end of formal proceedings, but which determine legal rights at an earlier stage. In *Cities Service Gas Company v. F.P.C., supra, Trailways of New England, Inc. v. C.A.B.,* 412 F.2d 926 (1st Cir. 1969), and *Isbrandtsen Co. v. United States, supra,* the courts reviewed as a final order the failure of agencies to suspend rate schedules prior to hearing. Also see *Trans-Pacific Freight Conference of Japan v. F.M.B.,* 302 F.2d 875 (D.C. Cir. 1962) (order to a shipping conference to cease collecting fines pending final decision held a final order and was reviewed by the Court of Appeals); *Phillips Petroleum Co. v. F.P.C.,* 227 F.2d 470 (10th Cir. 1955), *cert. denied,* 350 U.S. 1005 (1955) (order maintaining the status quo by suspending a rate schedule pending investigation and hearing reviewed by the Court of Appeals); and *Algonquin Gas Transmission Company v. F.P.C.,* 201 F.2d

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[45] *See Columbia Broadcasting System v. United States*, 316 U.S. 407, 425.

[46] *Isbrandtsen Co. v. United States, supra*, at 55.

334 (1st Cir. 1953) (denial of application for a temporary emergency permit during proceedings reviewed). In the words of the Tenth Circuit:

> "The orders sought to be reviewed here do not deal with the merits of the proceedings before the Commission in the sense that they were entered upon evidence concerning the reasonableness of the rates. They do not purport to finally determine Phillips wholesale rates. That matter is left to a conventional hearing in these proceedings. But the orders do purport to establish with finality the wholesale rates which Phillips was authorized to charge Michigan on June 7, 1954 and thereafter until changed by order of the Commission pursuant to hearing." *Phillips Petroleum Co. v. F.P.C.*, 227 F.2d 470 at 475.

Despite the fact that the order was not the final rate order, the Court of Appeals granted review.

While it does not follow a formal Section 4c proceeding, it is clear that the order denying Petitioners' requests is final except for the four uses.[47] At the end of Section 4c

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[47]Petitioners also note that neither the language of Section 4d of FIFRA nor anything in its legislative history prohibits review of such a final order. In this regard, Section 4d of FIFRA should be read together with the Administrative Procedure Act, under which a right to review must be presumed. *Abbott Laboratories v. Gardner,* 387 U.S. 136 at 140. Section 10b of the APA, 5 U.S.C. § 703, provides that "the form of proceeding for judicial review is the special statutory review proceeding relevant to the subject matter in a court specified by statute or, in the absence or inadequacy thereof, any applicable form of legal action . . . in a court of competent jurisdiction." Section 4d of FIFRA provides such a special statutory review procedure and is adequate.

The alternative is a bifurcation of review in which some FIFRA final orders are reviewed in the Court of Appeals and others in District Courts. The Supreme Court has rejected this approach in another area. *Foti v. Immigration and Naturalization Service*, 375 U.S. 217 (1963) (also see Jaffe, *Judicial Control of Administrative Action* 422, where bifurcation of review is criticized). The Court noted in *Foti* that the special Court of Appeals review procedure involved was added

proceedings for the four uses, presumably all that can be reviewed is a decision regarding those uses. There is no FIFRA proceeding in progress for cancellation of other DDT uses or suspension of DDT.

B. Respondents' Order Is a Final Reviewable Order Even Though It Is Not Based on a Record Developed During a Section 4c Proceeding

Since a final order need not necessarily come at the end of a formal administrative proceeding, it follows that it need not necessarily be based on a record developed during such proceeding. In fact, the cases cited above on finality (p. 33, *supra*) all involved situations where there was no record developed from a formal hearing. (See the quote from Phillips Petroleum at p. 34, *supra*.) There will obviously never be the kind of record in this cause which Respondents insist is needed for review if review is not available now. Indeed, there are no proceedings underway that would create such a record.

In the case of suspension, it is difficult to conceive of the kind of record Respondents insist on. Suspension is designed as a remedy which is operative while such a record is being made. After such a record is made and acted on, the time for suspension is past.

In fact, of course, there is an adequate record (pp. 4-6, 7-8, *supra*). It consists of the Petition, the related submissions, the Mrak Report and Respondents' Order. (App. 1-45). Nothing additional is needed for review of the decision and order before the Court. The evidence which was before Respondents was sufficient to compel the determination

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to the Immigration and Nationality Act because of Congressional dissatisfaction with the legal delays in deportation cases, 375 U.S. at 225, 84 S. Ct. at 312. This echoes the situation with regard to the 1964 amendments to FIFRA which were added because of Congressional dissatisfaction with the Court's difficulties in getting hazardous pesticides off the market (see pp. 15-18, 24, *supra*).

and findings that DDT is causing harm to man, animals and the environment and that it is an imminent hazard to the public.[48]

C. The Fact That Respondents Have Initiated Section 4c Proceedings For Only Four Uses of DDT Supports Petitioners' Contention That There Is a Final Order

As discussed earlier, Agriculture has issued Section 4c notices for four uses—but only four uses. This means, of course, that the Section 4c proceedings in progress only relate to the four uses and will result in a decision that only affects those four uses. Conversely, it means there are not proceedings underway for all other uses. Petitioners are not seeking review at this time of the cancellation of the four uses, but only of the decision not to issue Section 4c notices and inaugurate administrative proceedings for other uses and of the decision not to suspend any use at all.

Agriculture's statement in their Motion to Reconsider (p. 2, note 2) that administrative procedures are underway, citing the procedure for the four uses, is perhaps intended to suggest that this cause is not ripe for review. The main purposes of the ripeness doctrine is to prevent the courts from making decisions in the abstract, and more importantly, to protect agencies from interference while they are in the middle of proceedings. *Abbott Laboratories v. Gardner, supra,* at 148-49. However, in this case, except for the

[48]If, however, the Court believes the record is deficient, we note that Section 4d provides in part:

> "If application is made to the court for leave to adduce additional evidence, the court may order such additional evidence to be taken before the Secretary, and to be adduced upon the hearing in such manner and upon such terms and conditions as to the court may seem proper, if such evidence is material and there were reasonable grounds for failure to adduce such evidence in the proceedings below."

This provision obviously gives the Court all the authority it needs to deal with any deficiency.

four uses, there are no FIFRA proceedings with which the Court can interfere and Petitioners bring before the court a concrete problem for which there are specific remedies. The denial of the request for suspension and the request to issue Section 4c notices for all other uses of DDT is ripe for review.

D. The Fact That Respondents' Order Was In Part In Letter Form Is Irrelevant to Final Order Question

The fact that Respondents' order was in part in letter form is irrelevant to the final order question. The form of an order or its label does not determine whether it is an order. *Isbrandtsen v. United States, supra,* at 55. A telegram, *Phillips Petroleum Co. v. F.P.C.. supra,* at 474, or a letter, *United States v. Bass,* 215 F.2d 9 (8th Cir. 1954), can serve as an order, even if the Court finds it "obscure" and "ambiguous." *Schenley Industries, Inc. v. Fowler,* 275 F. Supp. 356 (D.C. D.C. 1967).

CONCLUSION

For all the reasons stated herein, Petitioners respectfully request that this Court grant the following relief:

(a) that the Order of December 11, 1969, in response to the Petition of October 31, 1969, be set aside;

(b) that the Respondents be ordered to follow statutory procedures, issuing Section 4c notices to commence the procedures by which the registrations of all economic poisons that contain DDT could be cancelled; and

(c) that the Respondents be ordered to immediately suspend the registrations of all economic poisons that contain DDT during Section 4c proceedings.

Respectfully submitted,

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February 13, 1970

1 App.

Before the
UNITED STATES DEPARTMENT OF AGRICULTURE

Environmental Defense Fund.
Incorporated,
Sierra Club,
West Michigan Enviornmental
Action Council, and
National Audubon Society.
Petitioners

TO: Honorable Clifford M. Hardin,
Secretary of Agriculture

PETITION REQUESTING THE SUSPENSION AND CANCELLATION OF REGISTRATION OF ECONOMIC POISONS CONTAINING DDT

Petitioners request the Secretary of Agriculture to exercise his authority under the Federal Insecticide, Fungicide, and Rodenticide Act, 61 Stat. 163, as amended, 7 U.S.C. §§ 135-135k, to take immediate action to ban the use of DDT. Scientific evidence which has been accumulating at an accelerating rate clearly establishes that DDT is causing irreparable damage to the environment, and present scientific information establishes that DDT is a cancer-causing agent. Many other jurisdictions, in this country and abroad, have banned or severely restricted the uses of DDT. The Federal Government, charged with responsibility for protecting the health and welfare of its citizens and the protection of the nation's natural resources, must take appropriate action to stop the use of DDT. The Department of Agriculture has the power to suspend the registration of DDT and economic poisons containing DDT. The Department should exercise that authority at once.

I. PETITIONERS

[2] Petitioner Environmental Defense Fund, Incorporated (hereinafter "EDF"), is a non-profit, tax-exempt membership corporation organized under the laws of the State of New York. EDF is made up of scientists and other citizens

dedicated to the protection of man's environment, employing legal action where necessary. EDF has, through litigation, sought to protect the environment from various forms of pollution. Its Scientists Advisory Committee, with more than 200 members, including some of the world's foremost environmental scientists, assures that positions taken are thoroughly supported by scientific evidence. An extensive bibliography on DDT has been compiled by EDF. The articles on DDT which are cited in this petition are listed in Appendix A, attached hereto.[1] In its activities, EDF does not concern itself with the pecuniary interests of individuals; rather, it seeks to assure the preservation or restoration of environmental quality on behalf of the general public.

Petitioner Sierra Club is a non-profit membership corporation organized under the laws of the State of California with membership of 80,000. The Sierra Club has been in existence since 1892. Among its stated purposes is the preservation of scenic resources, forests, waters, wildlife and wilderness. In furtherance of its purposes, the Sierra Club engages in many educational activities, including an extensive publishing program and wilderness [3] outing program. In addition, the Sierra Coub has participated in several legal actions to preserve the environment and maintains staff offices and membership chapters in all regions of the country.

Petitioner National Audubon Society (hereinafter "Audubon") is a non-profit membership corporation organized under the laws of the State of New York. Audubon has as its purposes the protection of wildlife and the natural environment, and the education of man regarding his relationship with and his place within the natural environment as an ecological system. Audubon has over 80,000 members and a history of 65 years devoted to these pur-

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[1] Also attached to the copy of the petition filed with the Secretary is a copy of the entire EDF bibliography, with reprints of the articles which are of special relevance.

poses. Audubon owns and operates 40 wildlife refuges, five nature interpretation centers and three adult ecological summer camps, and maintains a lecture program that reaches 200 cities annually. Audubon supports important research on endangered species and publishes papers on ecological research.

Petitioner West Michigan Environmental Action Council (hereinafter "the Environmental Action Council") is an unincorporated association. Its membership consists of 25 civic organizations and 300 individual members, primarily in West Michigan. Among the Environmental Action Council's stated purposes is assisting and coordinating the efforts of individuals and organizations to protect and restore the quality of the environment and to take necessary and appropriate action in furtherance thereof, including the dissemination of information through newsletters, lectures, seminars, participation in official hearings, and preparing and promoting model legislation.

[4] II. DEFINITIONS

"DDT," sometimes called dichlorodiphenyltrichloroethane, is a mixture of substances which has as its major ingredient the chemical compound 1,1,1-trichloro-2,2-bis-(*p*-chlorophenyl)ethane. DDT is widely used, in a variety of economic poisons, as a pesticide.

"DDT residues" include DDT; DDE, 1,1-dichloro-2,2-bis (*p*-chlorophenyl)ethylene; DDD, also known as TDE, 1, 1-dichloro-2, 2-bis (*p*-chlorophenyl)ethane; and several other closely related chemical compounds derived from DDT by conversion processes within the environment.

III. OTHER RELEVANT PROCEEDINGS

A. Petition to the Secretary of Health, Education and Welfare Requesting Repeal of Tolerances for DDT

On October 7, 1969, a petition was filed by six individuals and EDF with the Secretary of Health, Education and Welfare requesting the repeal of the tolerances for DDT on raw agricultural commodities. The petition, a copy of which is attached hereto as Appendix B, was based upon evidence that DDT is a carcinogenic or cancer-causing agent. (See, *infra,* pp.16-17.) Five of the individual petitioners therein are nursing mothers or are expecting to give birth in the very near future. The petition has not been acted upon as of this date.

On this day, said six individuals and EDF have requested the Secretary of Health, Education and Welfare immediately to repeal the existing tolerances for DDT on raw agricultural commodities and to set such tolerances at zero. In addition, Secretary Finch has been requested [5] to take all further steps to protect the health and welfare of the nation by banning the use of DDT on the ground that it is a carcinogen or cancer-causing agent. A copy of this petition was attached to the request addressed to the Secretary of Health, Education and Welfare. A copy of the request to the Secretary of Health, Education and Welfare is attached to this petition as Appendix C.

B. Requests for Information on DDT from the Department of Agriculture

The Petitioners have made diligent efforts to obtain from the Department of Agriculture documents relating to the registration of DDT and economic poisons containing DDT, and information in the Department's files relating to damage to the environment and to living man caused by DDT and such economic poisons.

On September 18, 1969, a request for access to such information was made by Petitioner Environmental Action Council. On October 14, 1969, Petitioner Environmental Action Council renewed its request of September 18, 1969, and sought some related information. On October 24, 1969, Petitioners EDF and Sierra Club joined in the above request of Petitioner Environmental Action Council.

As of this date, the Department of Agriculture has failed to respond to any of these requests and has failed to give Petitioners Environmental Action Council, EDF, or Sierra Club access to any records of the Department of Agriculture. As a result, petitioners are unable to identify with particularity those economic poisons containing DDT that have been registered by the Department of Agriculture. As a further result, petitioners have been unable to determine the extent to which the matters presented herein have been considered by the Department of Agriculture.

[6] C. Recent Actions by Administrative Agencies Against Carcinogenic Substances and Other Substances Posing Substantial Risks to Public Health

1. *Cyclamates*

A recent precedent was set by Secretary of Health, Education and Welfare Robert Finch for immediate administrative action to protect the public where there is evidence that a substance on the market and in common use has carcinogenic qualities. On October 18, 1969, the Secretary acted to remove cyclamates from the market only five days after learning of scientific evidence of their carcinogenicity. His action was based on "recent experiments conducted on laboratory animals which disclosed the presence of malignant bladder tumors after these animals had been subjected to strong dosage levels of cyclamates for long periods." See statements of Secretary Robert H. Finch and Jesse L. Steinfeld, Deputy Assistant Secretary for Health and Scientific Affairs, October 18, 1969, attached hereto as Appendix D.

Secretary Finch emphasized "in the strongest possible terms that we have no evidence at this point that cyclamates have indeed caused cancer in humans." However, he stated that he felt it "imperative to follow a prudent course in all matters concerning public health." Appendix D, Statement of Secretary Finch, p. 1.

Deputy Assistant Secretary Steinfeld added:

> "We can in no way at this time extrapolate the new data from rat experiments to human beings. Nevertheless, we in this Department—whether from a legal or from a scientific point of view—cannot afford to ignore any possibility of the rat data being applicable to the human population. As long as this possibility exists, a prudent concern for the health of the public [7] dictates that precautionary action be taken." Appendix D, Statement of Deputy Assistant Secretary Steinfeld, p. 6.[2]

2. *The Herbicide 2,4,5-T*

Dr. Lee A. DuBridge announced this week that the Federal Government will shortly initiate a coordinated series of actions to restrict the use of the herbicide 2,4,5-T. Among other actions, he stated that the Department of Agriculture would cancel the registration of the herbicide for use on food crops unless a basis can be found for establishing a safe legal tolerance before January 1, 1970. Office of Science and Technology, Executive Office of the President, Press Release, October 29, 1969.

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[2] In an action in 1959, Secretary of Health, Education and Welfare Flemming made it clear that the strong policy against permitting cancer-causing agents in the market applies to pesticides as well as other products. By administrative interpretation, he ordered the seizure of all cranberries found to have residues of the pesticide aminotriazole, which had been found to cause cancer in mice. See CCH, Food, Drug and Cosmetic Law Rptr., 54,109.03. See *Bell v. Goddard,* 366 F.2d 177, 181 (7th Cir. 1966) (use of food additive barred where it caused cancer in animals notwithstanding small quantities ingested by man.

The Department of Agriculture's cancellation of the registration was based on a finding that the herbicide caused deformities in rats and mice. The data relied upon did not establish that the herbicide would have deleterious effects in man. The measure was explained as having a prophylactic purpose: to "assure safety of the public while further evidence is being sought."[3]

D. Actions in Other Jurisdictions

The Michigan Agriculture Commission cancelled, effective June 27, 1969, the registrations of DDT except for control of bats, mice and head lice. Cancellation was based [8] on the facts that DDT is injurious to vertebrates and that there are safer alternative modes of pest control; thus DDT violated § 2z(2)(g) of the Michigan Economic Poisons Act. 12 Mich. Stat. Ann. § 352(2)(z)(2)(g). This standard is substantially identical to a parallel provision of the Federal Insecticide, Fungicide and Rodenticide Act. 61 Stat. 163, as amended, 7 U.S.C. §§ 135-135k (hereinafter "FIFRA").

On October 29, 1969, the Director of the California Department of Agriculture issued a regulation cancelling the registration of DDT for use in that State on 47 field crops.

On March 27, 1969, Sweden announced a moratorium on the use of DDT and several other chlorinated hydrocarbons.

In Canada, several of the provinces have taken action to ban DDT. Ontario, by Order-in-Council 3654-69, issued on September 24, 1969, banned all uses of DDT, effective January 1, 1970, with limited exceptions. Several other provinces have taken action regarding DDT or announced that action is impending. The Federal Government in Ottawa will shortly adopt stringent measures limiting the use of DDT.

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[3] It was also reported that research evidence showed that the herbicide increased the incidence of cancer. *Los Angeles Times*, October 30, 1969, part I, p. 11.

IV. APPLICABLE LAW: FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT

A. Economic Poisons

The Secretary of Agriculture regulates economic poisons under FIFRA. "Economic poisons," as defined in FIFRA § 2a, 7 U.S.C. § 135(a), include the various mixtures which have DDT as their active ingredient and appear on the market under trade names.

[9] B. Registration Requirements

Section 4a of FIFRA, 7 U.S.C. § 135b(a), requires that:

> "[E]very economic poison . . . which is shipped or delivered for shipment from any State, Territory or the District of Columbia to any other State, Territory or the District of Columbia, or which is received from any foreign country shall be registered with the Secretary [of Agriculture]."

C. Suspension of Imminent Hazards

Under § 4c of FIFRA, 7 U.S.C. § 135b(c), the Secretary of Agriculture has the duty to suspend by order the registration of an economic poison "when he finds that such action is necessary to prevent an imminent hazard to the public." See also 7 C.F.R. § 364.4(c), published at 34 Fed. Reg. 13822.

Either the fact that an economic poison is a cancer-causing agent or the fact that it is destructive of fish, wildlife and useful animals would be sufficient in itself to qualify it as an "imminent hazard to the public."

1. *Carcinogenicity*

Proof that an economic poison is a carcinogen is a prime example of the kind of showing which establishes that it poses "an imminent hazard." The rapid response of HEW in banning cyclamates and the announced actions against

the herbicide 2,4,5-T by the Department of Health, Education and Welfare and the Department of Agriculture (see pp.6-7 *supra*) confirm the Federal policy of banning cancer-producing agents by immediate action.

Congress has evinced special concern about carcinogenic or cancer-causing agents, declaring in the Food Additives Amendment to the Federal Food, Drug, and Cosmetics Act, 21 U.S.C. § 348(c)(3)(a):

[10] "[N]o additive shall be deemed to be safe if it is found to induce cancer when ingested by man or animal, or it is found, after tests which are appropriate for the evaluation of the safety of food additives, to induce cancer in man or animal . . ."

In 1960, Congress passed the Color Additives Amendments to that Act and included a similar anticancer clause. 21 U.S.C. § 376(b)(5)(B).

Arthur S. Flemming, the Secretary of Health, Education and Welfare at the time of the passage of the Color Additive Amendments, summarized the philosophy embodied in the anticancer provisions in testimony before the House Committee on Interstate and Foreign Commerce:

> "The preponderance of scientific evidence clearly dictates our position: Our advocacy of the anticancer proviso in the proposed color additives amendment is based on the simple fact that *no one knows how to set a safe tolerance for substances in human foods when those substances are known to cause cancer when added to the diet of animals.* I should like to underline again one statement in particular which I read earlier from the summary of Dr. [G. Burroughs] Mider's review of the role of certain chemical and physical agents in relation to cancer. It is this:
>
> > "'No one at this time can tell how much or how little of a carcinogen would be required to produce cancer in any human being, or how long it would take the cancer to develop.'
>
> "This is why we have no hesitancy in advocating the inclusion of the anticancer clause.

> "Unless and until there is a sound scientific basis for the establishment of tolerances for carcinogens, I believe the Government has a duty to make clear—in law as well as in administrative policy—that it will do everything possible to put persons in a position where they will not unnecessarily be adding residues of carcinogens to their diet." (See House Rpt. No. 1761, June 7, 1960, 2 U.S.C. Cong. & Admin. News, 86th Cong., 2d Sess., 2887 (1960)) (Emphasis supplied)

2. *Damage to Fish, Wildlife and Useful Animals*

Congress intended to include the hazard of destruction of fish, wildlife and useful animals as an "imminent [11] hazard." The "imminent hazard" provision was added by the 1964 amendments to FIFRA (78 Stat. 190). The Senate Committee Report, in discussing the imminent hazard concept, stated that damage to fish and wildlife should be given due consideration. See Senate Report No. 57 on S. 1605, 88th Cong., 1st Sess. (1963).

D. Cancellation of Economic Poisons Not in Compliance with FIFRA

In addition to immediate suspension of an economic poison as an imminent hazard, the Secretary of Agriculture has the duty to issue a notice of cancellation of the registration of an economic poison when it appears that the economic poison, its labeling, or other material do not comply with the provisions of FIFRA. FIFRA § 4c, 7 U.S.C. § 135b(c). Any economic poison which is "misbranded," as the term is defined, FIFRA § 2z(2), 7 U.S.C. § 135(2)(z)(2), is not in compliance with the Act. The Section 2z(2) definition of "misbranded" products states, in relevant part:

> "The term 'misbranded' shall apply . . . (2) to any economic poison . . . (c) if the labeling accompanying it does not contain directions for use which

> are necessary and if complied with adequate for the protection of the public; (d) if the label does not contain a warning or caution statement which may be necessary and if complied with adequate to prevent injury to living man and other vertebrate animals, vegetation, and useful invertebrate animals . . . (g) if in the case of an insecticide, nematocide, fungicide, or herbicide when used as directed or in accordance with commonly recognized practice, it shall be injurious to living man or other vertebrate animals, or vegetation, except weeds to which it is applied, or to the person applying such economic poison; . . ."

An economic poison is necessarily "misbranded" when it cannot be used in a manner which protects the public and prevents injury to man and animals. Where that is the case, a notice of cancellation should be issued.

[12] The regulations of the Department of Agriculture reflect the above standards in several provisions. See, *e.g.*, 7 C.F.R. §§ 362.6, 362.9, 362.10 (k), 362.105 (c), 362.105(h) 362.106 (f)(4)(v), 362.108 (c) (6), 362.121 (g).

E. Burden of Proof

The suspension and cancellation procedures of § 4c of FIFRA, discussed above, were added to FIFRA by amendment in 1964 (78 Stat. 190).

The purpose of the 1964 amendment was to give the Secretary full authority to remove hazardous and unlawful economic poisons from the market and to shift the burden of proving their safety to the registrant. House Report No. 1125 on H.R. 9739, 88th Cong., 2d Sess., 64 U.S.C. Cong. & Admin. News, 2166-2167.

V. THE DAMAGE CAUSED BY DDT TO MAN AND THE ENVIRONMENT

The Secretary must take account of the weight of scientific evidence which establishes that the continued use of DDT is inconsistent with the scheme of FIFRA. The Act presupposes that no economic poison will be registered, or where already registered that such registration will be suspended by the Secretary, if the economic poison poses an imminent hazard to the public or if it is injurious to man, animals or the environment. The hazards of DDT are now well documented and require immediate action.

In this section petitioners will describe the damage which DDT has caused to the environment and the threats it poses to human health. Because of the technical character of the issue and the numerous citations to scientific materials, petitioners have attached to this petition a list of leading [13] authorities. The numbered references in this section correspond to numbers in the list of authorities. See Appendix A.

The Affidavit of Charles F. Wurster, attached to this petition as Appendix E, also provides support for the propositions set out in this section. Dr. Wurster, the Chairman of the Scientists Advisory Committee of petitioner EDF, is a leading environmental scientist.

DDT, a pesticide which has been in common use since World War II, performed a useful function at a time when alternative pesticides were unavailable. Alternative pesticides and procedures that are of equal effectiveness but cause less damage are now available. (267, Appendix E, ¶ 17). The time has come for the Federal Government to act against the use of DDT. Because it is an imminent hazard to the environment and to human health, such action should be taken immediately.

DDT combines in a single molecule the properties of broad biological activity, chemical stability, mobility, and solubility, characteristics (139) that cause it to be accumu-

lated by living non-target organisms, thus presenting dangers that are unusual among major pollutants (268). DDT not only enters food chains from the inorganic environment, it is increasingly concentrated toward the top of food chains, thereby posing a particular threat to carnivores (90, 155, 156, 161, 208, 209, 214, 260).

Because DDT residues are mobile (4, 20, 21, 22, 41, 157, 181, 201), chemically stable (60, 137, 201), nearly insoluble in water (20) but quite soluble in lipid or fat-like materials (139), DDT cannot be used and released in the environment under any circumstances, whether or not in accord with any label or directions, without the eventual contamination [14] of food chains (86, 90, 106, 131, 155, 156, 161, 208, 209, 214, 252, 260), including human foods, and the tissues of non-target organisms, including man (50, 149, 223, 258).

The entire biosphere has, in fact, become contaminated with DDT residues, including such seemingly unlikely places as air (1, 2, 9, 157), rainwater (181, 205), birds living hundreds of miles at sea (155, 214), Arctic and Antarctic animals (71, 174, 182, 220, 225), and cosmetics, and human milk (148, 221). DDT residues are regular contaminants of human foods, including many foods never treated with the material, and contaminate the tissues of virtually all human beings (50, 149, 223, 258).

DDT residues retain their broad biological activity long enough to be hazardous to contaminated non-target organisms, most of which are far removed by both time and space from the original site of the DDT application. (Appendix E, ¶7).

The relationships between DDT residues and hazards to bird populations, by both direct mortality and reproductive failure, have been particularly well documented. DDT causes carnivorous birds, including birds of prey, sea birds, and many other species, to lay eggs with abnormally thin shells (88, 150, 211, 233). These eggs break prematurely, resulting in sharply reduced reproductive success (105).

Populations of these species have in many cases undergone catastrophic declines, in some cases approaching extinction (7, 87, 154, 214). The decline in eggshell thickness occurred shortly after the large scale introduction of DDT into the world environment in the late 1940's (88, 150). Controlled feeding experiments with DDT and its metabolites have established the causal relationship between DDT residues [15] in the environment, the production of eggs with abnormally thin shells, and greatly reduced reproductive success (218, 232, 256).

DDT causes direct mortality of large numbers of birds. This has been especially true where attempts were made to control Dutch elm disease with DDT, but has also occurred under many other circumstances (89, 191, 213, 236).

DDT inhibits reproduction in fish, with abnormal mortality of the fry following the contamination of the adult fish and their eggs. This has occurred in several freshwater situations, with mortalities of 100 percent of the fry in some instances (28, 47, 235). Controlled experiments confirmed that DDT residues were the causative agents (244, 245). Many fish from other areas, including commercially important fish from marine waters, show concentrations of DDT residues in their tissues that approach those that caused this abnormal fry mortality (8, 156, 224, 241). Important freshwater and marine fisheries are seriously threatened by present and anticipated future concentrations of DDT residues in the tissues of the fish. DDT also causes the direct mortality of large numbers of fish, a phenomenon that has occurred under a variety of circumstances (46, 62, 198).

DDT residues do great damage to useful invertebrates of many species. Insect communities are frequently disrupted by the killing of beneficial predatory and parasitic insects, thereby frequently aggravating the insect pest problem DDT was intended to control (100, 267). It kills pollinating insects. It damages various crustaceans such as crabs and shrimp (77, 117, 168, 253). Even the base of oceanic food chains, the phytoplankton, can have their photosynthetic

activity reduced by a few parts per billion of DDT in the water (215).

[16] By eliminating certain organisms, especially carnivorous organisms, from biotic communities, DDT residues are causing widespread ecological damage (208). Such ecosystem simplification contributes to population explosions of certain organisms lower in the food chain and normally controlled by the carnivores. Proliferation of herbivorous insect pests or herbivorous birds like blackbirds are examples of this phenomenon (267). The stability of ecosystems is thereby reduced by the disruptions caused by DDT.

DDT and its residues cause these serious environmental effects by virtue of the great variety of their biological activity within living systems. These residues are nerve toxins (49, 217), induce hydroxylating enzymes in the liver (42, 112, 145, 229), inhibit certain other enzymes, and interfere with the photosynthetic process (215). They also are known to induce estrogenic activity (17, 264).

DDT residues exhibit this broad range of biological activity within a great diversity of animals and even some plant species; their activity extends to all five classes of vertebrates—amphibians, reptiles, fish, birds, and mammals. With these non-target organisms serving as warning signals or monitors, showing the great and diverse biological activity of DDT within a broad range of animals, it is hardly surprising that DDT has now been shown to operate by yet another biological mechanism—it is a carcinogenic or cancer-causing agent. (Appendix E, ¶12.)

In a definitive study supported by the National Cancer Institute, DDT was added to the diet of mice and compared with both positive and negative [17] control groups of mice (238). The frequency of tumors of the liver, lungs and lymphoid organs was four times greater in mice fed DDT than those in the negative control group. The carcinogenicity was clearly established because DDT caused cancer of the same kind and at approximately the same frequency as did known cancer-causing agents (the positive controls) (238).

The National Cancer Institute study confirmed earlier evidence indicating the carcinogenicity of DDT. As early as 1947, a study by the Food and Drug Administration showed that when DDT was fed to rats there was an increased incidence of liver tumors (226). Similar results were obtained using rainbow trout, where DDT in the food of the fish caused the formation of hepatomas (231). Other experiments with mice carried through five generations showed that the DDT mice had a substantially higher incidence of leukemia and of tumors than the non-DDT mice (262).

In studies done at the University of Miami School of Medicine, human victims of terminal cancer were found to contain more than twice the concentration of DDT residues in their fat as did victims of accidental death (223, 258). The accident victims carried 9.7 parts per million in their fat, about average for Americans, while the cancer victims contained 20 to 25 parts per million.

Evidence that DDT causes cancer in human beings is not conclusive, but DDT is clearly carcinogenic in test animals. The evidence on DDT is similar to the evidence of the carcinogenic activity of the cyclamates. The Secretary of Health, Education and Welfare promptly withdrew cyclamates from the market on the basis of such evidence. The Secretary of Agriculture should do no less with DDT.

Alternative integrated control techniques, including the use of chemical, biological, and other pest management [18] procedures are available that are as effective as DDT (37, 65, 251, 267). Alternative techniques would not cause the injury to the environment nor pose the threat to human health described above if substituted for all of DDT's uses. (Appendix E, ¶17). DDT is a highly disruptive material in the environment and causes outbreaks of mites, aphids, and scale insects by killing their natural enemies (267). It has been stated by a leading authority in the field that DDT has no place in an integrated pest control system (267).

VI. CONCLUSIONS

The overwhelming scientific evidence establishes that DDT is a cancer-causing agent, is injurious to animal, bird and fish populations, and is causing serious ecological damage. For these reasons, the continued use of DDT poses an imminent hazard to the public, threatening human health and environmental resources. Petitioners have long been concerned with the interrelationship of a wholesome environment and human welfare. Further introduction of DDT into the environment is entirely inconsistent with the values which the Secretary of Agriculture is bound to preserve.

Specifically, petitioners have shown that DDT does not comply with the Federal Insecticide, Fungicide, and Rodenticide Act in the following respects:

(1) DDT is an imminent hazard to the public under section 4c of FIFRA, 7 U.S.C. § 135b(c), and the registration statements of all economic poisons containing DDT should be immediately suspended.

(2) DDT does not comply with the provisions of section 2z(2)(d) of FIFRA, 7 U.S.C. § 135(2)(z)(2)(d) since it is causing serious, permanent and irreparable injury to [19] entire populations of non-target vertebrate and useful invertebrate animals. No warning or caution statement contained in any label is or would be adequate if complied with to prevent this injury. The injury is occurring under the commonly recognized practices for the use of DDT.

(3) DDT does not comply with Section 2z(2)(c) of FIFRA, 7 U.S.C. § 135(2)(z)(2)(c), for the reasons that it is causing serious, permanent and irreparable damage to the public in that it is causing injury specified above in the preceding paragraph and that it (a) is causing serious, permanent and irreparable damage to the fish and wildlife resources of the United States; (b) is causing serious, permanent and irreparable ecological damage; (c) is a carcinogen, and (d) is causing serious, permanent and irreparable

damage to large numbers of diverse non-target organisms essential or beneficial to the public. No directions contained in any written material would be adequate if complied with to prevent said damage. The damage is occurring under the commonly recognized practices for the use of DDT.

(4) DDT does not comply with Section 2(z)(2)(g) of FIFRA, 7 U.S.C. § 135(2)(z)(2)(g), since when used as directed or used in accordance with commonly recognized practice it is injurious to living man and other vertebrate animals to which it is applied and to persons applying such economic poison.

(5) Alternative integrated control techniques, including the use of chemical, biological, and other pest management procedures are available that are substantially as effective as DDT and that do not presently cause the injury and harm set forth above and would not cause such harm if substituted for substantially all of DDT's uses.

[20] VII. PRAYER FOR RELIEF

Petitioners request that the Secretary:

By order, immediately, (1) suspend the registration of all economic poisons that contain DDT; and (2) issue Notices of Cancellation for all registered economic poisons that contain DDT, affording petitioners an opportunity to participate fully in any administrative proceedings held follow-

ing the issuance of notices of cancellation including the right to adduce evidence, to rebut and to cross-examine.

Respectfully submitted,

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October 31, 1969

Appendix A to Petition Requesting the Suspension and Cancellation of Registration of Economic Poisons Containing DDT

LIST OF AUTHORITIES

Reference numbers cited in Section V of this petition correspond to the numbers in the more extensive Bibliography, one copy of which was submitted to Secretary Hardin, entitled "A Bibliography on the Effects of DDT on Non-Target Organisms."

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Appendix E to Petition Requesting the Suspension and Cancellation of Registration of Economic Poisons Containing DDT

AFFIDAVIT

The undersigned, Charles F. Wurster, being duly sworn, deposes and says:

1. I presently reside at Oldfield, New York, My address is Department of Biological Sciences, State University of New York, Stony Brook, New York 11790.

2. I am a professional environmental scientist. My professional credentials, background and bibliography are attached to this Affidavit as Appendix A. [Not reprinted in this Appendix]

3. Whenever I use the term DDT herein I mean the mixture of substances commonly known as DDT, which stands for dichlorodiphenyltrichloroethane, and which has as its major ingredient the chemical compound 1,1,1-trichloro-2,2-bis(*p*-chlorophenyl)ethane. Whenever I use the term "DDT residues," I mean DDT as defined above, and DDE, 1,1-dichloro-2,2-bis (*p*-chlorophenyl) ethylene, and several other closely related chemical compounds derived from DDT by conversion processes within the environment.

4. DDT is a broad-spectrum, persistent chemical biocide with an extremely low water solubility, and a high solubility in lipids. Because of these properties and a variety of mechanisms that transport DDT, it leaves its original site of application, eventually contaminating the food chains and tissues of non-target organisms.

5. More than 100,000,000 pounds of DDT is manufactured and released into the environment each year. It is applied in a wide variety of pest control situations by many different techniques. Because DDT residues are mobile, chemically stable, slightly soluble in water, and quite soluble in lipid or fat-like materials, DDT cannot be used and released in the environment [2] under any circumstances, whether or not in accord with any label or directions, without the eventual contamination of food chains, includ-

ing human foods, and the tissues of non-target organisms, including man.

6. The entire biosphere has, in fact, become contaminated with DDT residues, including such seemingly unlikely places as air, rainwater, birds living hundreds of miles at sea, Arctic and Antarctic animals, cosmetics, and human milk. DDT residues are regular contaminants of human foods, including many foods never treated with the material, and they contaminate the tissues of essentially all human beings.

7. DDT residues retain their broad biological activity long enough to be hazardous to contaminated non-target organisms, most of which are far removed by both time and space from the original site of the DDT application.

8. DDT has long been known to be an extremely serious environmental hazard, although the extremity of the situation has become more obviously apparent in recent years. DDT causes carnivorous birds, including birds of prey, sea birds, and many other species, to lay eggs with abnormally thin shells. These eggs break prematurely, resulting in sharply reduced reproductive success. Populations of these species have in many cases undergone catastrophic declines, in some cases approaching extinction itself. Controlled experiments confirm that DDT residues were the causative agents. DDT also directly kills large numbers of birds.

9. DDT also inhibits reproduction in fish, with abnormal mortality of the fry following the contamination of the adult fish and their eggs. This has occurred in several freshwater situations, with mortalities of 100 percent of the fry in some [3] instances. Controlled experiments confirmed that DDT residues were the causative agents. Many fish from other areas, including commercially important fish from marine waters, show concentrations of DDT residues in their tissues that approach those that caused this abnormal fry mortality. I conclude that important freshwater and marine fisheries are seriously threatened by present and anticipated future concentrations of DDT residues in the tissues of the fish. DDT also directly kills large numbers of fish.

10. DDT residues do great damage to useful invertebrates of many species. Insect communities are frequently disrupted by the killing of beneficial predatory and parasitic insects, thereby frequently aggravating the insect pest problem DDT was intended to control. It kills pollinating insects. It also damages various crustaceans such as crabs and shrimp. Even the base of oceanic food chains, the phytoplankton, can have their photosynthetic activity reduced by a few parts per billion of DDT in the water.

11. By eliminating certain organisms, especially carnivorous organisms, from biotic communities, DDT residues are causing widespread ecological damage. Such ecosystem simplification contributes to population explosions of certain organisms lower in the food chain and normally controlled by the carnivores. Outbreaks of herbivorous insect pests or herbivorous birds like blackbirds are examples of this phenomenon. The stability of ecosystems is thereby reduced by the disruptions caused by DDT.

12. DDT and its residues cause these serious environmental effects by virtue of the great breadth of their biological activity within living systems. These residues are known to be estrogenic, to be inducers of hydroxylating enzymes in the [4] liver, to be inhibitors of certain other enzymes, and to interfere with the photosynthetic process. DDT residues exhibit this broad range of biological activity within a great diversity of animals, and even some plant species; their activity extends to all five classes of vertebrates—amphibians, reptiles, fish, birds, and mammals. With these non-target organisms serving as warning signals or monitors—with great and diverse biological activity occurring within a broad range of animals—it is hardly surprising that DDT has now been shown to operate by yet another mechanism—it is a carcinogenic or cancer-causing agent.

13. DDT causes cancer in test animals. While we do not have conclusive evidence that DDT causes cancer in human beings, DDT must be labelled carcinogenic.

14. In studies done at the University of Miami School of Medicine, human victims of terminal cancer were found to contain more than twice as much DDT residues in their fat as did victims of accidental death. The accident victims carried 9.7 parts per million, which is about average for Americans, while the cancer victims contained 20-25 parts per million in their fat.

CONCLUSIONS

15. DDT is causing serious, permanent and irreparable injury to entire populations of non-target vertebrate and useful invertebrate animals. No warning or caution statement contained in any label would be adequate if complied with to prevent said injury. Said injury is occurring under the commonly recognized practices for the use of DDT.

16. DDT is causing serious, permanent and irreparable damage to the public in that it is causing the injury specified above and that it (a) is causing serious, permanent and irreparable damage to the fish and wildlife resources of the United [5] States; (b) is causing serious, permanent and irreparable ecological damage; (c) is a carcinogenic or cancer-causing agent; and (d) is causing serious, permanent and irreparable damage to large numbers of diverse non-target organisms essential or beneficial to the public. No directions contained in any written material would be adequate if complied with to prevent said damage. Said damage is occurring under the commonly recognized practices for the use of DDT.

17. Alternative integrated control techniques, including the use of chemical, biological, and other pest management procedures are available that are substantially as effective as DDT that do not presently cause the injury and harm set forth above and would not cause said harm if substituted for substantially all of DDT's uses.

18. My above-stated opinions are based upon my knowledge of the research of many scientists as communicated

personally and by publication in recognized scientific journals, and, in part, upon my own research investigations.

For all the reasons set forth herein, DDT is an imminent hazard to the public and its use should be immediately suspended.

/s/ Charles F. Wurster

Subscribed and sworn to before me this 28th day of October, 1969.

/s/ Dorothy M. Kern
Notary Public

My Commission Expires: 1/14/74

Senator MONDALE. We stand in recess.

(Whereupon, at 12:30 p.m., the subcommittee was recessed, subject to call of the Chair.)

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